VOL. 23

SEPTEMBER, 1938

NO. 9

# The Welding Engineer

MEMBER

Associated Business Papers
Audit Bureau of Circulations
American Welding Society
International Acetylene Association

G. H. MACKENZIE
*President and Treasurer*

RALPH S. KENRICK
*Editor*

M. S. HENDRICKS
*Promotion Manager*

» «

Eastern Representative:
T. E. DEPEW, 1834 Broadway, New York, N. Y.
Tel. Columbus 5-7843.

Western Representative:
L. C. MONROE, 608 South Dearborn Street,
Chicago, Ill. Tel. Webster 7134.

Pacific Coast Representative:
W. R. McINTYRE, 446 Western Pacific Bldg.,
Los Angeles, Calif. Tel. Prospect 0565.

» «

Published on the 15th of each month by The Welding Engineer Publishing Company, 608 South Dearborn Street, Chicago, Illinois. Telephone Webster 7134

Advertising copy must be received not later than the 5th of each month.

## IN THIS ISSUE

Convention Week in Detroit (Editorial) ..... 29

Who Shall Control Business? (Editorial) ..... 29

Electronic Control Modernizes Resistance Welding (E. H. Vedder) ..... 31

All Eyes Will Converge on Detroit During Convention Week ..... 35

Program of Annual A.W.S. Meeting ..... 36

Exhibits at National Metal Exposition ..... 40

New Product Developments ..... 46

Flame-Cut Shapes and Arc Welding Are Cutting Fabrication Costs ..... 51

Lincoln Foundation Award Jury Announces Winners of 382 Cash Awards ..... 57

News of the Industry ..... 60

» «

A.S.T.M. Discusses Effect of Temperature and Fatigue ..... 39
New Product Developments ..... 46
Welder Improves a Pit Ladder ..... 58
News of the Industry ..... 60
Personals ..... 62
A. W. S. Activities ..... 64
Trade News ..... 64
Construction ..... 65
Current Reviews ..... 66
Recent Patents ..... 67
Trade Literature ..... 68
Classified Section ..... 69

Subscription, payable in advance: United States and possessions, and Canada, $3 a year; Foreign Countries, $4 a year; Single copy, domestic, 25 cents; Single copy, foreign, 35 cents. Entered as second-class matter January 20, 1916, at the postoffice at Chicago, Illinois, under the act of March 3, 1879.

FOREIGN REPRESENTATIVES: AUSTRALIA and NEW ZEALAND—R. Hill, Matlock House, Davenport, Auckland, New Zealand; GREAT BRITAIN—A. D. Baynes, 6, Mordaunt House, Larkhall, Clapham, London, S. W. 8, England; SOUTH AFRICA—J. W. Arnison, 35a Victoria Avenue, Benoni, Transvaal, South Africa; JAPAN—Maruzen Company, Ltd., 6, Nihonbashi, Tori-Nichome, Tokyo, Japan; U. S. S. R.—Mesdunarodnaja Kniga, Kusnezki Most 18, Moscow, U. S. S. R.

## . . . and it more than justified the choice

● The turbine pump streamline runner hub illustrated above was fabricated of Cor-ten steel. Welds of high ductility were requested. Smooth beads were desired. And, naturally, the company wanted to hold welding time down as much as possible. So, they selected Page Hi-Tensile "G". The results were more than satisfactory.

On many production jobs like this—and on many maintenance and construction jobs—Page Hi-Tensile "G" has earned a reputation as a fast, smooth-running rod that produces a remarkably tough bead. Meets all requirements of A. W. S. specifications, Grade 10. Write for full details.

**PAGE STEEL AND WIRE DIVISION**
**AMERICAN CHAIN & CABLE COMPANY, Inc.**
MONESSEN, PENNSYLVANIA

BUY ACCO QUALITY
TRADE MARK

**A FEW OF THE 137 AMERICAN CHAIN & CABLE INDUSTRIAL PRODUCTS**

**AMERICAN CHAIN DIVISION**
(DOMINION CHAIN COMPANY, Ltd., in Canada)
Weed Tire Chains • Welded and Weldless Chain • Malleable Castings
Acco-Morrow Lubricators

**AMERICAN CABLE DIVISION**
Tru-Lay Preformed Wire Rope • Tru-Loc Processed Fittings • Crescent Brand Wire Rope
Tru-Stop Brakes • Tru-Level Oil Controllers

**ANDREW C. CAMPBELL DIVISION**
Abrasive Cutting Machines • Floformers
Special Machinery • Nibbling Machines

**FORD CHAIN BLOCK DIVISION**
Chain Hoists • Trolleys

**HAZARD WIRE ROPE DIVISION**
Lay-Set Preformed Wire Rope • "Korodless" Wire Rope • Preformed Spring-Lay Wire Rope • Guard Rail Cable

**HIGHLAND IRON & STEEL DIVISION**
Wrought Iron Bars and Shapes

**MANLEY MANUFACTURING DIVISION**
Automotive Service Station Equipment

**OWEN SILENT SPRING COMPANY, Inc.**
Owen Cushion and Mattress Spring Centers

**PAGE STEEL AND WIRE DIVISION**
Page Fence • Wire and Rod Products
Traffic Tape • Welding Wire

**READING-PRATT & CADY DIVISION**
Valves • Electric Steel Fittings

**READING STEEL CASTING DIVISION**
Electric Steel Castings, Rough or Machined Railroad Specialties

**WRIGHT MANUFACTURING DIVISION**
Chain Hoists • Electric Hoists and Cranes

*In Business for Your Safety*

**PAGE *Welding* WIRE**

# Convention Week in Detroit

THE THIRD WEEK in October 16-21, will find several thousand technical men assembled in Detroit to attend the National Metals Exposition and Metals Congress. Interest in metals is basic. Our present day industrial development is made possible by the improved metals and fabricating techniques available to engineers. Metals have played a very important part in the development of new and better products. Welding and cutting is always a "natural" at the Metal Show. Interest in welding and cutting will be very much in evidence during Convention Week.

A study of the American Welding Society technical program reveals that an effort has been made to offer welding men two groups of technical papers, one of primary appeal to the research experts and a second group of papers of primary appeal to the more practical men who must limit their interest to the bread and butter problems of using welding in repair or fabrication. As was done last year at Atlantic City, the A. W. S. program provides for simultaneous meetings every day of the convention. We believe this to be a highly commendable feature of the 19th annual meeting. It will enable the welding man to select his own technical program and to employ his time most profitably. A similar policy will be followed by the American Society for Metals in its comprehensive program, embracing 49 lectures by some 76 different authors. Program selection will be an important responsibility of each delegate.

An opportunity to meet men of similar interests with problems similar to your own is afforded by these annual pilgrimages to the Metal Show and Welding Society meetings. What can be picked up from personal contacts with well-informed men always adds immensely to a welding man's background of knowledge and experience.

Being able to see equipment and new products actually in operation, to see it in three dimensions, to examine it personally, to ask questions about it, are admittedly beneficial to the man who is striving to keep informed. This is probably the quickest and most desirable method of gaining knowledge. Visitors to the National Metal Show in Detroit will have this opportunity.

For those unable to attend, we hope the preview of Convention Week in this issue and the articles and digests of technical papers to follow in the next few months will keep our readers well informed on what's new in welding.

# Who Shall Control Business?

"FREE COMPETITION and the working of economic laws will adequately control the size of big business," says a report recently issued by the Economic Research Division of the National Industrial Conference Board. "The government should step in only when monopolistic practices and price-fixing agreements exist," according to this report. The attitude of the New Deal administration has been sharply at variance with the views of business men as covered in the report of the Conference Board. Too much government control is stifling to business.

Certain very definite advantages in large-scale business operations were pointed out by this survey of executive opinion. Among the advantages cited are: Mass marketing leads to increased sales, greater stability, mass purchasing power, and low-cost assembly-line production techniques. It is stated that these often result in lower prices to the consumer. Practically all business executives agreed that big organizations have rendered a definite service to the public in fostering research. Industrial progress would be hampered without the large sums spent on research and technical development by the large companies. Particularly is this true in the welding industry.

This survey of the National Industrial Conference Board was not a "white washing of big business," because executives emphasized certain disadvantages in the operation of large-scale enterprises. There is a tendency to disregard public opinion and to spend lavishly on "public relations" to influence public esteem. Criticisms were made that big business management is often inefficient, overpaid, hampered by red tape, too easily influenced by internal politics and too self-satisfied, with a consequent decrease in progressive thinking.

It was the majority opinion of those surveyed that large-scale businesses offer many advantages and economies, particularly in the steel and automotive industries where a large investment of capital is required. It was also apparent that business men are alive to the danger of government collectivism should business units grow to such size that they become public rather than private enterprises.

# SELF-INDICATING

**"Shield-Arc's" New and Exclusive Self-Indicating Dual Continuous Control brings you these cost-cutting benefits:**

**QUICK SETTING**—Enables *anyone*—veteran welder, novice welder, helper or apprentice—to set the *"Shield-Arc"* for any desired class of work and any welding current in *one or two seconds' time.*

**POSITIVE RESULTS**—"Bull's eye" performance at all times. No need for "get acquainted" period. Gives right TYPE and SIZE of arc for every job. Maximum welding quality and speed. Exceptionally wide range. The full benefits of Dual *Continuous* Control.

**AT NO EXTRA COST**—This new feature is standard for all motor-driven, engine-driven and belted generator type Lincoln *"Shield-Arc* SAE" Welders.

Consult the nearest Lincoln office for complete details or mail the coupon.

## EXCLUSIVE FEATURES OF THIS NEW LINCOLN WELDER

**DUAL CONTINUOUS CONTROL**—Gives any TYPE or SIZE of arc for faster welding, better results and wider range. Provides more than 100,000 possible combinations of voltage and current.

**SELF-INDICATING SELECTORS**—Simplify setting of control for positive results every time.

**SELF-PROTECTED MOTOR**—Permits use of larger electrodes for 15% to 20% faster welding. Welder will not burn out.

**INDEPENDENT EXCITATION**—Steadies the arc at all times. Minimizes spatter.

**LAMINATED MAGNETIC CIRCUIT**—A costly construction that contributes to arc stability and welding range . . . . . **and 25 others.**

See this sensational new **"Shield-Arc"** in action at the National Metal Show.

**THE LINCOLN ELECTRIC CO.**
**Dept. CC-531, Cleveland, Ohio**

☐ Have a Lincoln man call to explain the new Self-Indicating *"Shield-Arc."* ☐ Send free bulletin.

Name _____ Position _____

Company _____

Address _____

City _____ State _____

# LINCOLN

LARGEST MANUFACTURERS OF ARC WELDING EQUIPMENT IN THE WORLD

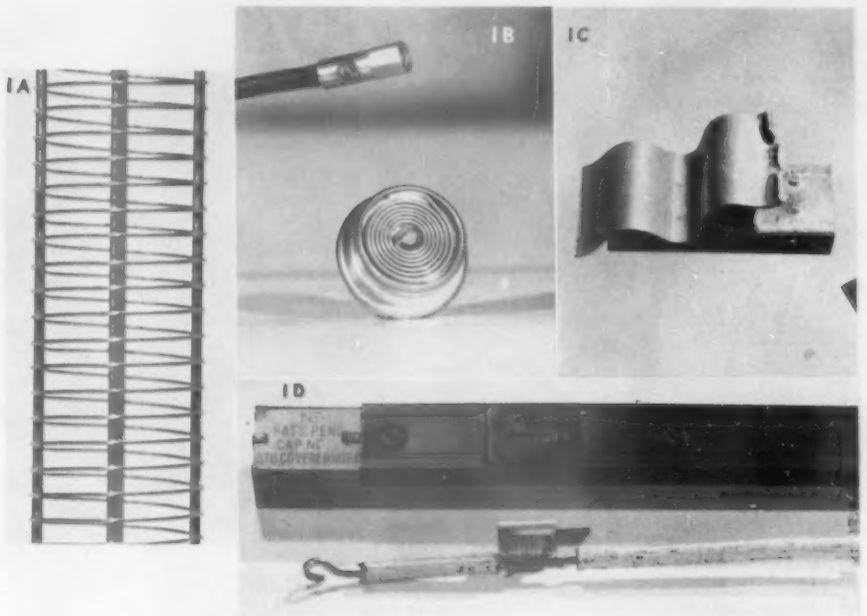



**Fig. 1—Spot Weld Samples**

**(A) Section of tantalum grid structure of large radio transmitting tube showing weld consistency; 3 cycles timing.**

**(B) Cigar lighter heating element welded to center contact stud and electric connection terminal to braided copper insulated wire.**

**(C) Section of sidewalk structure of Smithfield St. bridge, Pittsburgh. 0.081 in. thick; timing 6 cycles; welding current 28,000 amp.**

**(D) Phosphor bronze connector welded to No. 14 tinned copper wire.**

## Ignitron control of current duration

# Modernizes Resistance Welding

★ Exact timing by electronic valves makes resistance welding more of a precision process—Higher speeds now possible—Stronger and more consistent welds—Neater appearance

**By E. H. VEDDER**

**Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.**

RESISTANCE WELDING* has been used for many years, but only within the last four or five years has the process been improved by means of adequate control. Previously, automatic weld timing was measured in seconds. The use of the process was, therefore, largely confined to such sheet steel structures as would tolerate severe electrode indentation, warping, blackening and scaling.

Recently, resistance welding has become more of a precision process. Exact timing of the welding current with time values as low as 1/120th second is largely responsible. Because of this and other improvements, the piece is welded without the warping, burning or electrode marking on the surface. Plated stocks are welded with little surface disturbance. Many premachined parts are precision welded to close tolerances. One of the most important results is that resistance welding can now be used for joining a wide variety of modern alloy metals such as stainless steel, brasses and bronzes. Also, non-ferrous metals of sharp fusion point, such as aluminum, can be welded satisfactorily. Some examples of what can now be done are shown in Fig's. 1, 2 and 3.

A further result, in addition to the improvement of quality, has been the improvement in welding speeds. The resistance welding machine is now fitted, in many applications, with index or magazine feed and so takes its place in the production line. As high as 120 ft. per minute of continuous formed channel is being fabricated from steel strip with 3-in. spaced spots, each the equivalent of a rivet, using the machine in Fig. 4.

### Major Variables

The three major variables which must be properly controlled are: (1) current magnitude; (2) time of current flow, and (3) pressure.

These three variables must be correctly adjusted with respect to each other and precise control of each is necessary to produce welds having: (1) maximum strength, (2) minimum indentation, discoloration, and metallurgical change or warping, and (3) a high degree of consistency between welds. In the past, weld timing has been much too long to give the best results. The majority of welds should be made in less than one second

*The term "resistance welding" as employed in this paper applies only to resistive type welding at maintained high contact pressure between welded parts. Flash welding is not included.

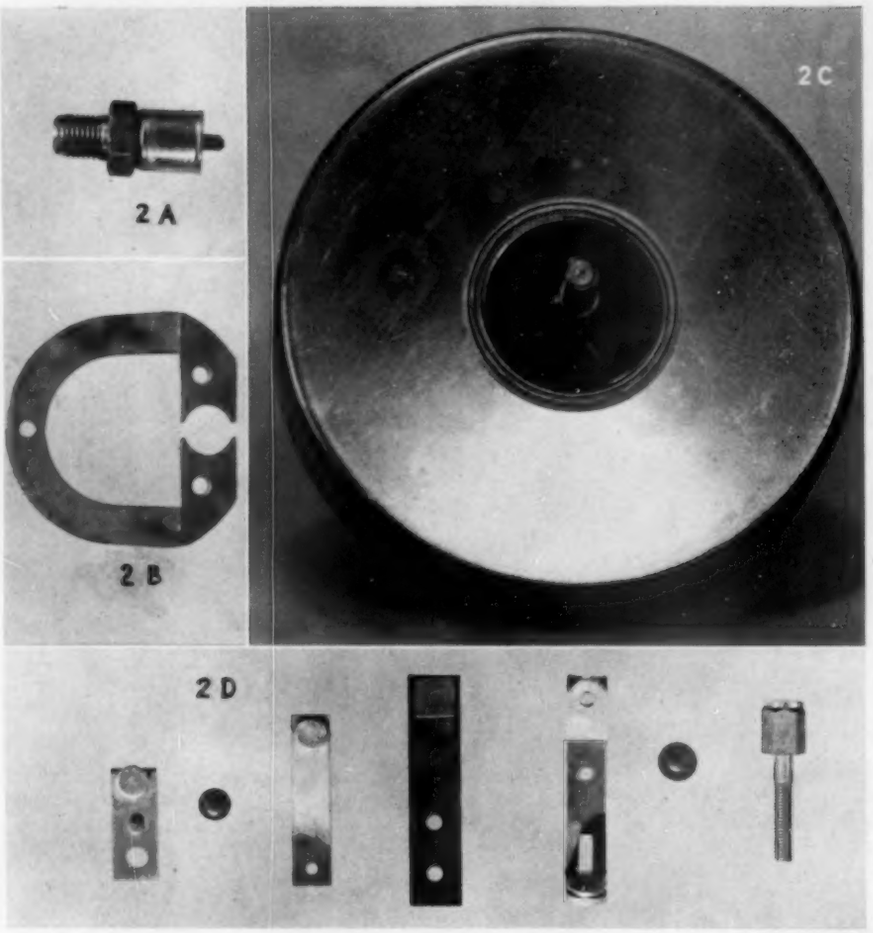



**Fig. 2—Projection Weld Samples**

**(A) Pressure-tight fitting; pressed cup welded to screw machine part with ½ in. diameter ring projection weld.**

**(B) Permanent magnet. Hardened magnet steel horseshoe welded to two mild steel pole faces. Each weld is ⅜ in. long and pole face gap is held to close tolerance.**

**(C) Metal ignitron tube parts. Anode lead-in eye-let welded to mild steel header with 1-in. diameter ring projection weld; vacuum tight.**

**(D) Silver contacts with steel backs welded to cadmium plated brass, spring steel and mild steel.**

and some as low as 1/120 sec. duration. Weld timing of such short duration is more difficult to control accurately than is current magnitude or pressure.

Recent years have seen the development of electronic timing and control equipment which time and interrupt the current through any resistance welding machine now required with all but absolute accuracy, even with weld timing as low as 1/120 sec. The availability of such precise control has encouraged the improvement of non-electronic timing controls and of great importance, has also brought to light lesser inaccuracies in the control of all factors in resistance welding. Once known, such inaccuracies could be improved. Thus, electronic control has greatly extended the usefulness of resistance welding.

Some of the advantages resulting from the use of such accurate control spot or seam welding timers are outlined below.

A. Quality

1. Strength of weld and consistency of reproduction.
2. Neatness of weld.
   (a) Welds can be made with no indentation on one side.
   (b) No burning.
   (c) Discoloration reduced or eliminated.
   (d) No warping caused by excessive heat.
   (e) Plated stock welded with minimum disturbance to plating.
3. Metallurgical properties less affected because of short weld duration.
   (a) Retain stainless properties of stainless steel.
   (b) Stainless steel strength kept at maximum.

**Fig. 3—Butt and Seam Weld Samples**

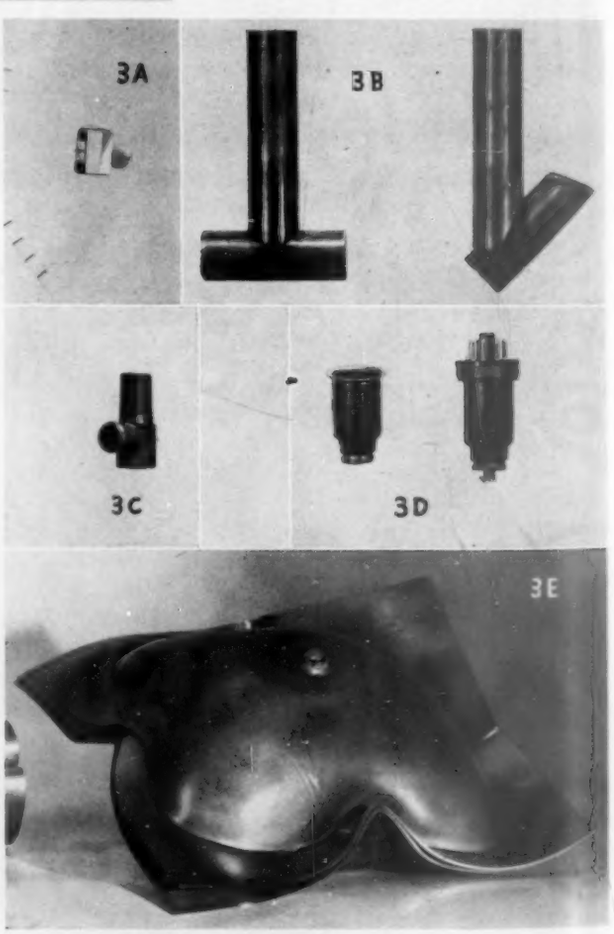
**(A) Instrument pivots 0.017 in. diameter, hardened steel welded on end to 0.007-in. thick steel ribbon. Cut apart for individual pivots and cemented to coil as shown.**

**(B) Steel tubing 1 in. in O.D. pre-machined.**

**(C) Formed tubing 0.50 in. diameter with end notched to weld to hexagon screw machined part; drilled after welding.**

**(D) Radio tube shell, mild steel welded to mild steel pressed bottom. Shell before welding shown. Timing 6 cycles; welding current, 35,000 amp.**

**(E) Silicon bronze 0.50 in. thick seam welded test pillow. Pressure tight seam weld, 3 cycles "on," 4 cycles "off"; speed 4 ft. per min. Material failed near edge of weld at 480 psi. hydraulic pressure; nipple gas welded.**



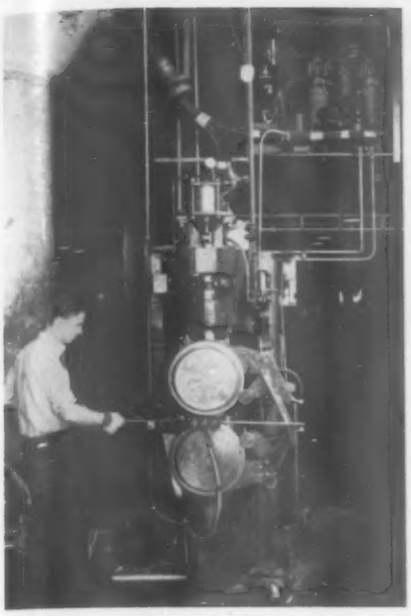


**Fig. 4—Seam welding machine and timer used to make spots spaced 3 in. apart on panel formed from steel strip. Linear speed 120 ft. per min.**

STRENGTH OF WELD: Resistance welding is being used more and more in applications requiring structural strength. The strength of welds becomes of utmost importance for these applications. It is also important from the standpoint of minimum cost that maximum strength of welds be maintained in order that the number of welds may be reduced to a minimum. For maximum strength, weld timing must be correct in relation to current and pressure and once adjusted, must remain identical for every weld, as is the case only if accurately synchronized and timed control is used. A reduction of pressure, with other factors remaining constant, causes "spitting" with weak and unreliable welds. Extremely short timing, even with increased current, allows insufficient weld penetration and results in weak welds. On the other hand, too long timing with low current allows the heat to flow away from the weld into the work and causes burning and warping and often deep sinking in of the electrodes. Aside from poor appearance, such welds do not have maximum strength.

Riveting is being used less than previously in the manufacture of aircraft and lightweight trains and is being superseded by resistance welding in order to reduce expense. For such applications, strength is of utmost importance and accurate timing is an absolute necessity when aluminum and high-tensile strength alloys are used. Thirty ignitron timers are in continuous service in one large factory to construct stainless steel trains and marine structures.

Small welds such as those used in electronic tubes are difficult to make reliably with manual or mechanical timing, because the best timing is short and the metals used are often those difficult to weld. The opimum timing is usually from ½ to 5 cycles—1/120 to 1/12 sec. Figure 1A shows a tantalum water cooled grid assembly used in a large transmitting tube. One defective weld out of the large number involved can mean the loss of up to $100 or more of work-in-progress even if detected before shipment, since repair of the interior of a tube after assembly is impracticable. The material value of this assembly alone is $5.00, and spoilage, even though detected during welding, is expensive. The inexpensive weld timer used in Fig. 5B is adaptable to this type of application. This same type of timer is used for other small parts such as toys and thermostats, some of which are shown in Fig. 5A.

Stainless steel is one of the alloys

**Fig. 5A—Small electrical parts spot-welded on machine shown below.**

**Fig. 5B—Spot welder and electronic timer (under bench) used for small parts.**

**Fig. 6—Refrigerator evaporator—Includes 7 ft. of pressure type seam welding and about 350 spot welds, all electronically controlled.**

which require accurate, reliable timing. The correct control of all factors not only insures maximum strength, but retains the non-corrosive properties of the metal.

NEATNESS: Welds can be made with no indentation on one side so that the material can be later plated or enameled without finish grinding. This is done by using a flat electrode on the side where no indentation is desired and a pointed electrode on the other. Welds cannot be made without some indentation on at least one side, although this can be reduced to a minimum with proper control. The electrode is not the whole answer and adequate timing control is necessary, as otherwise burning and discoloration will take place, thus offsetting the effect of using proper electrodes.

A natural result of the use of inaccurate timing methods is overdoing a weld just to make certain that it will hang together. The resulting weld has some strength but not the maximum. Besides this, it is not neat because of excessive forging action, warping and burning. When accurate and reliable timing is used, it is no longer necessary to overdo the welds in order to make certain that all welds will have adequate strength. The shortened timing used with modern control eliminates the discoloring, warping and burning of the material, because the short time does not permit the heat to flow away from the weld area. Because of the localized heat, plated stock can be welded with minimum disturbance to the surface.

The logical conclusion, therefore, is that accurate control of all factors including timing is very important. The effort is well repaid if a better product results.

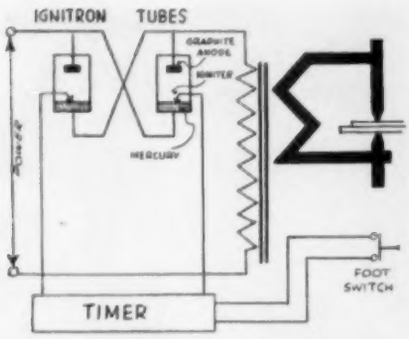



**Fig. 7—Schematic wiring diagram of resistance welder with ignitron control.**

The low cost of welding helps promote its use. Even when resistance welding is already being used, the addition of proper control often results in remarkable savings. Savings are experienced for many different reasons which vary with the application. A few of these will be described.

GRINDING AND MACHINING: The accurate control of welding often eliminates preliminary and finish grinding. The reduction or elimination of grinding and machining of the welded parts is probably one of the greatest savings. Preliminary grinding is sometimes necessary to remove scale, particularly on steel coming from certain types of annealing furnaces. In one seam welding installation, the machines had been run with continuous 60 cycle power applied with no interruption. All seam areas had to be ground prior to welding. Installation of an ignitron timer on a test machine eliminated grinding and reduced rejects to such an extent that several more controls were installed.

An important reduction of cost can be accomplished by the elimination of finish grinding. In some applications, the completed weld must be such that enameling or plating can be done directly over the weld. This problem is closely related to neatness and often the welding can be done so perfectly that finish grinding is entirely unnecessary. Nearly all of the refrigerator manufacturers are now using, or contemplate doing so in the near future, resistance welding with ignitron timers to make refrigerator evaporators. Some of these designs require plating immediately after welding and this can be done when properly controlled resistance welding is used. A finished evaporator of this type is shown in Fig. 6. For those applications merely requiring neatness, the surface is left smooth and unburned.

A large ignitron control is now in constant service to butt weld up to 3¼ in. pipe with a ⅜ in. wall. This installation replaces a flash welder and eliminates the upset which squeezes metal and scale out into a ridge at the weld requiring finish boring. This installation requires 9,000 amp. of current in the primary winding of the welding transformer at 550 volts, or nearly 5,000 kva. The weld duration is about 25 cycles referred to a 60 cycle power supply. These high currents are timed and interrupted by ignitron tubes. For units of such high rating, the ignitron tubes are bolted and gasketed so that they can be repaired like motors instead of requiring costly periodic replacement. A reliable vacuum pumping system is built into the controller. Approximately 150 units of smaller and larger rating all using this type of construction are in everyday service. A contactor capable of handling such power would be both inaccurate and costly to maintain.

**Fig. 8A—Ignitron seam welding timer installation.**

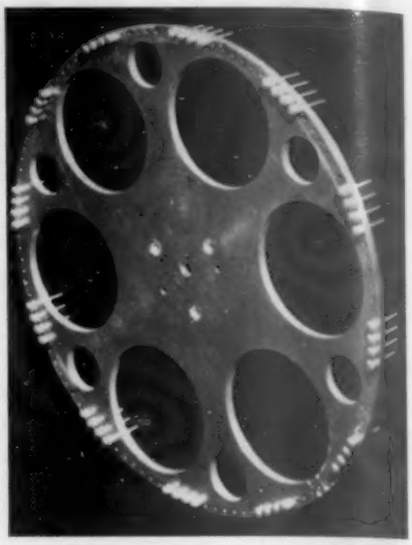


**Fig. 8B—Timing disk for ignitron timer; pin clamping disk has been removed.**

ALLOYS AND NON-FERROUS METALS: Many metals and alloys such as aluminum and stainless steel are difficult or impossible to weld without electronic control. One of the more important of these is aluminum, which is representative of the narrow welding range materials. Unlike mild steel, aluminum and many other metals and alloys have sharp fusion points and hence, narrow range of current, pressure and time within which good welds are obtained. Outside of these narrow ranges, no weld is obtained, or holes are melted in the material accompanied by violent arcing.

*(Mr. Vedder's article on resistance welding will be concluded in the October, 1938 issue.—Editor.)*

An aerial view of Ford Motor Company's Rouge plant.

**Special Insert Devoted to a Pre-View of Two Big Metal-Working Events**

Annual Meeting of

# American Welding Society

• at Book-Cadillac Hotel

» «

Welding and Cutting Exhibits of

# National Metal Exposition

• at Detroit Convention Hall

Tentative technical
program of

# Annual A. W. S. Meeting

★ Simultaneous technical sessions will permit welding men to select their own program—All meetings will be held at Book-Cadillac hotel

DETROIT WILL BE HOST to thousands of technical men interested in metals and welding during Convention Week, October 16-21. A typically American industrial city, fourth largest in population, Detroit symbolizes modern industrial production. Technical men come from all over the world to visit the busy plants in this city and witness the precision, volume, and speed of Detroit's manufacturing. The third week of October will be a very busy and interesting one for those who attend the American Welding Society annual meeting, judging by the tentative technical program.

The upswing in industrial activity, which is already under way and the increased interest in welding and cutting processes foreshadow an excellent attendance at the 19th annual meeting of the Society. All technical meetings will be held at the Book-Cadillac Hotel. Other technical societies cooperating with A. W. S. are American Society For Metals, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, and The Wire Association.

President P. G. Lang, Jr., will call the convention to order Monday morning, October 17, after which Hon. Richard W. Reading, mayor of Detroit, will address the meeting and welcome the members to Detroit. This will be followed by presentation of medals. Recipients of these medals have not yet been announced. The Monday morning technical program will be devoted to welding in construction work, starting with a paper by A. N. Kugler on "Oxy-Acetylene Welding of Carbon-Molybdenum Steel Pipe." Chairman Lang will preside, assisted by C. A. McCune as vice-chairman.

A.W.S. meetings will be at Book-Cadillac hotel.

P. G. LANG, JR.—President

There will be simultaneous technical sessions on every day of the convention, both morning and afternoon, with the exception of Wednesday afternoon. No technical sessions are scheduled for Wednesday afternoon, so as to permit welding men to visit the exhibits of the National Metal Exposition at Convention Hall. The annual dinner will be held at 7 p.m. Thursday evening in the Grand Ballroom of the Book-Cadillac. Harvey Campbell of the Detroit Chamber of Commerce will be toastmaster. W. J. Cameron, well known as Ford Motor Co.'s radio program speaker, will address the dinner group. His subject has not yet been announced.

On Friday morning at 11:30 a.m. is scheduled the annual business meeting of the Society. President Lang will present his report and election of officers will conclude the meeting. The Board of Directors will hold a luncheon immediately following. A number of exhibits and inspection trips have been planned for delegates to the National Metal Exposition, including trips to any of the following plants: Ford Motor Co., Cadillac Motor Co. and Chrysler Corp.

For the ladies attending the Detroit Metals Congress an entertainment program has been arranged, including a tour of Detroit, the Ford Rotunda, trips to Greenfield Village, Cranbrook and luncheon at Dearborn Inn.

On the following pages will be found a complete tentative program of the annual A. W. S. meeting in Detroit:

## MONDAY—OCTOBER 17th

### 9:30 A.M.—Morning Session—Italian Garden

Chairman: P. G. Lang, Jr., President of A. W. S.

Address of Welcome by Hon. Richard W. Reading, Mayor of Detroit, Mich.

Presentation of A. W. S. Award Medals.

WELDING IN CONSTRUCTION WORK

Chairman: P. G. Lang, Jr., Bridge Engineer, Baltimore & Ohio, R. R.

Vice-Chairman: C. A. McCune, Magnaflux Corp.

"Oxy-Acetylene Welding of Carbon-Molybdenum Steel Pipe," by A. N. Kugler, Applied Engineering Dept., Air Reduction Sales Co.

"Single-Pass Electric Welding of Unfired Pressure Vessels," by R. M. Wallace, Assistant Superintendent, The Griscom-Russell Co.

"Welding Structures," by Albert S. Low, Vice-President, The Austin Co.

### 2:00 P.M.—Simultaneous Technical Sessions—(A) Italian Garden

PRODUCTION WELDING OF SMALL MACHINE PARTS

Chairman: K. L. Hansen, Electrical Engineer, Harnischfeger Corp.

Vice-Chairman: F. E. Rogers, Manager, Applied Engineering Dept., Air Reduction Sales Co.

"Welding, Cutting and Machine Design of Small Sub-Assemblies," by Edward J. De Witt, Vice-President, Wallace Supplies Mfg. Co.

"Welding as Applied to Fabrication of Industrial Stokers," by F. R. Mason, Riley Stoker Corp.

"Methods For Manufacture of Precision Assemblies by Resistance Welding," by F. D. Rogers, International Business Machines Corp.

"Arc Welding as Influenced by Shop Preparation, Tools, Jigs and Fixtures," by M. S. Evans, American Car & Foundry Co.

### 2:00 P.M.—Simultaneous Technical Sessions—(B) Grand Ballroom

INDUSTRIAL RESEARCH SESSION

Chairman: Col. G. F. Jenks, Ord. Dept., U. S. Army.

Vice-Chairman: E. Vom Steeg, Jr., General Electric Co.

"Physical and Chemical Properties of the Nickel-Iron Alloys Formed in Welding of Nickel Clad Steel," by W. G. Theisinger, Lukens Steel Co. and F. G. Flocke, International Nickel Co.

"Weldability of Medium-Carbon Steel," by R. W. Emerson, Westinghouse Elec. & Mfg. Co.

"Effect of Current, Pressure and Time on Shear Strength and Structure of Spot Welds in Aluminum Alloys," by G. O. Hoglund and G. S. Bernard, Jr., Aluminum Co. of America.

"An Investigation of Arc and Gas Welded Joints in Aluminum and Aluminum Alloys," by Lieutenant Commander R. K. Wells (CC) U. S. N. and A. G. Bissell, Bureau of Construction and Repair, Navy Dept.

COL. G. F. JENKS—Senior Vice-President

**W. SPRARAGEN—Technical Secretary**

## TUESDAY—OCTOBER 18th

**9:30 A.M.—Simultaneous Technical Sessions—(A) Italian Garden**

JOINT SESSION WITH A. S. M. E.

Chairman: A. E. WHITE, University of Michigan.
Vice-Chairman: C. W. OBERT, Union Carbide and Carbon Res. Labs.

"Welding of Ammonia Containers," by E. H. BEHLING, Vilter Mfg. Co.

"Brazing Tubes in High-Pressure Boilers With Silver Alloys," by A. W. WEIR, New York Central Railroad and H. M. WEBBER, General Electric Co.

"Welding Bronze and Non-Ferrous Alloy Piping," by H. D. LANTERMAN, Carbide and Carbon Chemicals Corp.

"Welded Joints in Carbon-Molybdenum Piping," by R. W. CLARK, General Electric Co.

**9:30 A.M.—Simultaneous Technical Sessions—(B) Grand Ballroom**

FUNDAMENTAL RESEARCH SESSION

Chairman: J. J. CROWE, Air Reduction Sales Co.
Vice-Chairman: MILTON MALE, U. S. Steel Corp. of Delaware.

"Quick Shop Test for Quality of Weld And Its Correlation with Standard Tests," by W. J. CONLEY, The University of Rochester.

"Effect of Rigid Beam-Column Connections on Column Stresses," by INGE LYSE and E. H. MOUNT, Lehigh University.

"Residual Stresses Due to Circumferential Welds in Pipes," by E. L. ERIKSEN, University of Michigan.

"Welding Arcs From Standpoint of Recent Investigations," by Dr. C. G. SUITS, Research Laboratory, General Electric Co.

**2:00 P.M.—Simultaneous Technical Sessions—(A) Italian Garden**

WELDING AND CUTTING PROCESSES

Chairman: E. A. BALSLEY, Link Belt Co.
Vice-Chairman, P. J. HORGAN, General Electric Co.

"Quality and Efficiency in Oxygen Cutting," by GEORGE M. DEMING, Air Reduction Sales Co.

"Bi-Metal Construction of High-Temperature Steel Valves," by E. R. SEABLOOM, Crane Co.

"Weld Penetration," by JOHN HRUSKA, Chief Metallurgist, Electro-Motive Corp.

"Bronze-Welding," by W. S. WALKER, The Linde Air Products Co.

**2:00 P.M.—Simultaneous Technical Sessions—(B) Grand Ballroom**

FUNDAMENTAL RESEARCH SESSION

Chairman: A. B. KINZEL, Union Carbide and Carbon Research, Laboratories, Inc.
Vice-Chairman: E. R. BENEDICT, Contract Welders, Inc.

"Photo-elastic Analysis of Stresses in Lap Plates of Welded Joints," by A. G. SOLAKIAN, Polarized Light Co.

"Metallurgical Aspects of Resistance Welding Electrodes," by Dr. R. H. HARRINGTON, Research Laboratory, General Electric Co.

"Crater Formation in Arc Welding," by GILBERT E. DOAN, Lehigh University.

"Creep Test of Arc-Welded Low-Carbon Steel," by N. F. WARD, University of California.

"Stress Distribution in Welds Subjected to Bending," by C. D. JENSEN and R. E. CRISPEN, Lehigh University.

**7:30 A.M.—Fundamental Research Conference—Founders Room**

## WEDNESDAY—OCTOBER 19th

**9:30 A.M.—Simultaneous Technical Sessions—(A) Italian Garden**

WELDING IN MACHINE DESIGN

Chairman: EVERETT CHAPMAN, Lukenweld, Inc.
Vice-Chairman: W. W. PETRY, Cincinnati Milling Machine and Cincinnati Grinders, Inc.

"Recent Developments in Welding of Machine Tools," by L. F. NENNINGER, Chief Engineer, and W. A. MADDOX, Welding Supervisor, Cincinnati Milling Machine and Cincinnati Grinders, Inc.

"Machine Flame Cutting with Small Machines," by OTTO C. VOSS, Allis-Chalmers Mfg. Co.

"Welding and Cutting in Machinery Construction," by J. GORDON, General Manager, Taylor Winfield Corp.

**9:30 A.M.—Simultaneous Technical Sessions—(B) Grand Ballroom**

FUNDAMENTAL AND INDUSTRIAL RESEARCH SESSIONS

Chairman: C. H. JENNINGS, Westinghouse Elec. and Mfg. Co.
Vice-Chairman, W. M. HAYES, Air Reduction Sales Co.

"Progress in Copper Welding," by IRA T. HOOK, Research Engineer, and CLINTON E. SWIFT, Welding Engineer, American Brass Co.

"Carbon Arc Welding of Silicon Bronzes," by E. S. BUNN, J. R. HUNTER and W. G. SEIDLITZ, Revere Copper and Brass, Inc.

"Studies of the Spot Welding of Low-Carbon and Stainless Steels," by W. F. HESS and R. L. RINGER, JR., Rensselaer Polytechnic Institute.

"Shrinkage and Other Initial Stresses in Welds," by M. F. SAYRE and E. A. WINZENBURGER, Union College.

**2:00 P.M.—No Technical Sessions Scheduled for Wednesday Afternoon—Members Expected to Attend National Metal Exposition in Convention Hall**

## THURSDAY—OCTOBER 20th

**9:30 A.M.—Single Technical Session—Italian Garden**

AUTOMOTIVE SESSION

Chairman: WALTER ANDERSON, Taylor Winfield Corp.
Vice-Chairman, C. L. EKSERGIAN, Budd Wheel Co.

"Flame Hardening with the Oxy-Acetylene Flame," by H. J. SHEPPERD, Chief Metallurgist, Kelsey Hayes Wheel Co.

"Automobile Body Welding," by E. H. Foss, The Murray Corp. of America.

"Welding of Rear Axle Housings," by E. L. BAILEY and V. KNECHT, Chrysler Corp.

**2:00 P.M.—Single Technical Session—Italian Garden**

AUTOMOTIVE SESSION

Chairman: VAUGHAN REID, City Pattern Works.
Vice-Chairman: A. S. DOUGLASS, The Detroit Edison Co.

"Resistance Welding in the Automotive Industry," by A. DI GIULIO, Ford Motor Co.

"Automatic Carbon Arc Welding in the Automotive Industry," by F. M. MAICHLE, The Lincoln Electric Co.

"Use of Welding in Reconditioning Used Cars," by T. W. Moss, Chrysler Motors Service.

"Arc Welding Road Equipment," by ELMER ISGREN, Superintendent, R. G. Le Tourneau, Inc.

**7:00 P.M.—Annual Banquet—Grand Ballroom**

HARVEY CAMPBELL of the Detroit Chamber of Commerce will be toastmaster.

W. J. CAMERON of the Ford Motor Co. will be the principal speaker.

## FRIDAY—OCTOBER 21st

**9:30 A.M.—Simultaneous Technical Sessions—(A) Italian Garden**

SHIPBUILDING SESSION

Chairman: A. G. BISSELL, Bureau of Construction & Repair, Navy Department.
Vice-Chairman: S. S. SCOTT, Brooklyn Navy Yard.

"All-Welded Steel Power Boats," by MILO BAILEY, Bailey Steel Shipbuilding Co.

"Erection Sequence and Welding Procedure of All-Welded Lake Freighters," by RUSSELL BRENDLE, Great Lakes Engineering Works

"Welding Coast Guard Vessels," by D. E. WHITEHOUSE, Defoe Boat and Motor Works.

**9:30 A.M.—Simultaneous Technical Sessions—(B) Grand Ballroom**

RAILROAD SESSION

Chairman: H. C. BOARDMAN, Chicago Bridge & Iron Co.
Vice-Chairman, ELMER T. HOWSON, Simmons-Boardman Pub. Corp.

"Arc Welding of Truss-Type Railroad Car," by A. M. UNGER, Pullman-Standard Car Mfg. Co.

"Flash Welding of Rails," by H. C. DRAKE, Sperry Products, Inc.

"Machine Gas Cutting in Large Steel Foundry," by W. D. MURRAY, General Foreman, Steel Foundry Division, Canadian Car & Foundry Ltd. and H. E. HORWOOD, Railway & Engineering Specialties Ltd.

**11:30 A.M.—Annual Business Meeting—Italian Garden**

Report of President P. G. LANG, JR.
Election of Officers.
Board of Directors will hold a luncheon immediately after conclusion of annual business meeting.

**2:00 P.M.—No Technical Sessions Are Scheduled**

Inspection trips will be arranged to any of the following automotive plants: Ford Motor Co., Cadillac Motor Co., Chrysler Corp.

# A.S.T.M. Discusses Effect Of Temperature and Fatigue

★ That there has been no diminution in the interest and work being done in the field of effect of temperature on metals, especially elevated temperatures involving creep, was evident at the A. S. T. M. annual meeting.* The Joint Research Committee on Effect of Temperature presented a rather voluminous report outlining results of numerous investigations it is carrying on. One of the projects which should be of much value to all those concerned with the effect of temperature on metals at high temperatures is the volume on Creep Data which is soon to be published. This gives extensive information and data developed by the committee covering a wide range of carbon and alloy steels, irons and some non-ferrous metals.

Work on creep test of tubular members subjected to internal pressure indicated that under certain conditions a pressure vessel may decrease in length during service and under other conditions may increase in length substantially at the same rate as the diameter increases. However, the committee in charge of this project wishes to draw no definite conclusions of the work at this time, needing certain other data which were not yet available.

A final report on long-time creep tests of a 0.35 per cent carbon steel involving a test duration of 22,438 hrs. indicated that the extrapolation from the 2,000 hr. period was conservative as compared with actual deformation over 20,000 hrs. Other reports covered investigations to ascertain whether an agreement in creep results could be obtained by different laboratories using A. S. T. M. tentative methods for long-time tension tests and report on the acceptability tests for high temperature characteristics. A progress report on the effect of manufactured variables on creep resistance indicated a decided superiority of creep resistance at 750, 850, and 950 deg. F. for coarse-grained plain carbon steel over fine-grained plain carbon steel.

There was a great deal of interest, evidenced by discussion, in the paper presented by S. H. Weaver of the General Electric Co. on "Actual Grain Size Related to Creep Strength of Steels at Elevated Temperatures." The paper was based on a statistical analysis of 32 creep tests made on S. A. E. No. 4330 steel at a creep temperature of 840 deg. F. The author concluded that there is an optimum grain size for the maximum creep stress and that a larger or smaller grain than this gives decreasing stress for the particular steel and temperature. It was reported that grain size may change the creep strength by 21,000 psi. and that the structure within the grain can change the creep strength by 4500 psi.

*Concluded from report of A.S.T.M. annual meeting in the August, 1938 issue, pages 26-27.

**Convention Hall in Detroit will house the National Metal Exposition.**

Convention week will
draw thousands to

# National Metal Exposition

## Welding and cutting exhibits will hold spotlight at The Metal Show— Over 230 exhibitors will have space

TAKING ADVANTAGE of the industrial importance of Detroit, over 230 exhibitors will display their wares. These companies are planning larger and finer displays than ever before, according to "Bill" Eisenmann, Exposition secretary. Convention Hall's 90,000 square feet of space will be crowded with operating displays of welding and cutting equipment, metallurgical processes and new products.

The exhibits at the National Metal Exposition form a definite part of the program during convention week. Of the more than 230 exhibits about one-third will display products definitely related to welding and cutting and of special interest to welding men. The doors of the Convention Hall will open at 12 noon Monday, October 17th, and will remain open until 10 p.m. On Tuesday and Wednesday Convention Hall will also be open from 12 noon to 10 p.m. On Thursday the National Metal Exposition will be open from noon to 6 p.m. and on Friday from 9 a.m. to 7 p.m. It should be noted that Friday is the only day when the Convention Hall will be open during the forenoon.

Reviewing the list of exhibitors it is apparent that many key men in the welding, heat-treating and metallurgical fields will be in attendance at exhibit booths. This will afford an opportunity to personally contact men who can be helpful in the solution of welding and heat-treating problems.

### Exhibits of Interest to Welding Men

**Acme Steel Co., Chicago. (Booth A310)**

Exhibiting (in operation): The complete line of Acme Superstrip, including hot and cold rolled as well as stainless and galvanized. Of particular interest will be the exhibit of strip steel in colors and with rolled-in designs. A new development is an electro galvanized strip steel with a permanent bright lustrous finish. The care with which Acme Superstrip is packed for shipment will be demonstrated as the application of these methods may effect savings for other shippers.

**Aetna-Standard Engineering Co., The, Youngstown. (Booth C416)**

Exhibiting (in operation): The 12-inch Aetna-Connor continuous 5-draft wire drawing machine will be operated in actual production of high carbon steel wire to demonstrate its advantages in design, manipulation and speed.

**Air Reduction Sales Co., New York City. (Booth B515)**

Exhibiting: Airco's display will include two oxy-acetylene machines that were introduced during the current year. These are the Airco-DB No. 10 Radiagraph, a light-weight inexpensive gas cutting machine and the Airco-DB No. 20 Travograph which is designed for shape-cutting over large and extended areas. Both of these machines will be demonstrated in actual operation. The

No. 10 Radiagraph will show its effective cutting ability on a number of miscellaneous operations. The No. 20 Travograph will demonstrate shape cutting with multiple torches. A ten-cylinder oxygen manifold and a four-cylinder acetylene manifold will supply the gases for the Travograph.

Airco will also demonstrate three different types of flame hardening operations, using the Airco-DB No. 4 Radiagraph. This machine is suited for this type of work and its adaptability has aided the rapidly increasing uses of flame hardening. The Airco-DB No. 4 Radiagraph will also be demonstrated making double-beveled cuts.

An interesting and informative regulator demonstration will occur each day throughout the show. Also on display will be Airco-DB deseaming equipment and several samples of tube welding. In one portion of the booth will be cylinders of the many various gases manufactured by Air Reduction.

### Allegheny Ludlum Steel Corp., Watervliet, N. Y. (Booth C402)

Exhibiting: Tool steels, Nitraloy, FCC products.

In Attendance: W. L. WEAVER, special representative, in charge; H. I. ASKEW, J. J. CRUICE, A. L. HOPE, GEO. EGER, K. L. CLARK, manager FCC products; A. K. MARTIN, and THOS. MOORMAN.

### American Brass Co., The, Waterbury, Conn. (Booth C410)

Exhibiting (in operation): Anaconda copper and copper alloy welding rods. Demonstration of both electric and oxyacetylene welding. Displays of alloys, such as the high strength engineering alloy Everdur Silicon-Copper, Avialite, the copper aluminum alloy used for valve seats, guides and spark plug bushings in aeroplane and other internal combustion engines and Anaconda Beryllium-Copper, the new high strength heat treatable copper-rich alloy. Displays of die pressed forgings, extruded shapes and pressure die castings as well as supernickel and phosphor bronze head plates.

In Attendance: T. B. SMITH, E. B. BROWN, and C. E. SWIFT.

### American Car and Foundry Co., New York. (Booth C431)

Exhibiting (in operation): No. 2 two-electrode rivet heater; No. 1 one-electrode horizontal type "C" heater; and the No. 3 two-electrode combination fully automatic and hand-feed heater.

In Attendance: F. C. CHESTON, sales agent; H. C. CHESTON, sales agent, and W. J. BISSET.

### American Gas Association, New York. (Booth, combined Industrial Gas Exhibit)

Exhibiting (in operation): Gas heat treating and melting equipment in cooperation with 13 manufacturing companies and the gas utility company members of the Association.

### American Manganese Steel Division, Chicago Heights, Ill. (Booth C251)

Exhibiting: Boxes, pots and other small furnace castings.

In Attendance: W. G. HOFFMAN, assistant general sales manager.

### American Steel & Wire Co., Cleveland. (United States Steel Corp. Subsidiary.) (Booth B121)

Exhibiting: Wire and rods of all types, stainless and cold finished strip, detailed exposition of the austempering process and products so treated, demonstration of tests. See also "United States Steel Corp. Subsidiaries."

### Arcos Corp., Philadelphia, Pa. (Booth A542)

Exhibiting: Stainless and other alloy welding equipment and electrodes. Tests for stainless weld deposits. Metallurgy of stainless welds.

In Attendance: R. D. THOMAS, president; H. N. EWERTS, sales manager; K. W. OSTROM, assistant to superintendent, and R. E. CARRIAT, secretary.

### Automatic Gasflux Co., The, Cleveland, Ohio. (Booth C211)

Exhibiting: A new process for brazing and non-ferrous welding, using the company's liquid "Gasflux."

In Attendance: W. L. ULMER, CHARLES A. MEDSKER, J. M. BIALOSKY, and J. L. SULLIVAN.

### Baldwin-Southwark Corp., Eddystone, Pa. (Booth B415)

Exhibiting (in operation): A 6000-lb. Southwark Tate-Emery universal testing machine, a Southwark type 5-50 universal testing machine, a R. R. Moore fatigue testing machine, a Carpenter torsion impact testing machine, a 1000-lb. Bernhard oscillator, a Rayflex fatigue testing machine, a Morehouse proving ring, and various types of De Forest strain gages.

### Bastian Blessing Co. (The), Chicago. (Booth A105)

Exhibiting: Will conduct an operating exhibit illustrating mass production welding of small parts. Display will include Rego gas manifolds—Rego welding and cutting apparatus—Economizers—Air regulators—Cylinder valves—Liquefied petroleum gas apparatus. A contest will be run with a prize each day to the visitor who makes the best guess as to the number of parts welded each day.

In Attendance: ELLSWORTH L. MILLS, vice-president; HARRIS A. GOODWIN, district sales manager; H. O. T. RIDLON, district sales manager; R. ADAM JOHNSTONE, district sales manager, and J. C. OWEN, sales department.

### Bausch & Lomb Optical Co., Rochester, N. Y. (Booth A537)

Exhibiting (in operation): Large research type metallographic equipment for bright field, dark field and polarized light, large standard metallographic equipment, routine metallographic equipment, new contour measuring projector, Ortho-Stereo camera and Ortho stereoscope, Petrographic microscope, Brinell microscopes, wide field binocular microscopes, spectrum measuring microscope, and dust counter.

### Bethlehem Steel Co., Bethlehem, Pa. (Booth B131)

Exhibiting (in operation): 1. turret top, fenders and other deep drawn parts. Will feature views of the key operations in the continuous strip mill. Coils of 72 in. strip will be shown. 2. Mayari R high-tensile, low-alloy steel. Typical applications in the automotive field. 3. Model of 25 ton furnace for alloy steels. 4. Operating models of wire rope and stranding machines, supplemented by views of plant operations. 5. Bethanized wire, wire rope, strand, and other products. 6. Tool steels.

### Carborundum Co., The, Niagara Falls, N. Y. (Booth A509)

Exhibiting: A complete line of grinding wheels for both snagging and precision grinding, as well as tool room, cut-off, roll grinding, crank and cam shaft and diamond wheels. Abrasive paper and cloth will also be exhibited and polishing grain.

In Attendance: S. F. COURTER and F. J. TONE, JR., salesmanagers; B. H. WORK, A. H. PREY, and H. J. WILLS, sales engineers; C. J. STEUBER, Detroit district sales manager; C. H. NIEKAMP, P. R. DUMAS, J. STORM, R. L. PLACE and J. H. THOMAS, Detroit salesmen; J. C. RICE, and J. E. RICE.

### Carnegie-Illinois Steel Corp., Pittsburgh, Pa. (United States Steel Corp. Subsidiary). (Booth B121)

Exhibiting: Sample sections of high-tensile, corrosion-resistant Cor-Ten, Man-Ten, and stainless steels, sheets showing available grades and finishes, new data on hardenability, slag-control, and other metallurgical tests, movie, "Cor-Ten, Its Manufacture and Uses," structural shapes, flats, rounds and bars, in carbon and alloy grades. See also "United States Steel Corp. Subsidiaries."

### Chase Brass & Copper Co., Waterbury, Conn. (Booth A519)

Exhibiting: Interesting samples of welded and fabricated products of Chase brass, copper and bronze. Actual demonstrations of welding copper and Olympic Bronze will be held during the show. All types of difficult welds—butt, fillet and lap will be shown on copper, bronze and steel. Among fabricated parts on display will be Olympic Bronze tanks and water heaters, welded copper bus tube assemblies, 12-in. Olympic Bronze fittings and fabricated pipe, copper headers, copper fin tubing, brass forgings, Olympic Bronze evaporators, deep-drawn shells, hot-rolled angles and welding rods. A working model of a newly designed sluice gate made of Chase Olympic Bronze for sewerage work will also be on display.

In Attendance: J. J. VREELAND, DR. D. K. CRAMPTON, O. W. HARRINGTON, ROBERT LEA, H. P. CROFT and FRANCIS GELLO.

**Compressed Industrial Gases, Inc., Chicago, Ill. (Booth B252)**

Exhibiting: Will have on display a complete line of Victor welding and cutting apparatus manufactured by Victor Equipment Co. of San Francisco. On display at the CIG booth will also be the CIG Automatic Gas-O-Graph flame-cutting machine, a newly developed automatic shape-cutting machine. This machine represents an innovation in shape-cutting machines, both from the point of design and price. The machine will be in operation.

The CIG pipe cutting and beveling machine will be displayed at the CIG booth along with the complete line of CIG welding and cutting accessories and supplies.

In Attendance: LEONARD POOLE, district manager, Detroit; J. D. MORROW, salesman.

**de Sanno and Sons, Inc., A. P., Philadelphia, Pa. (Booth A107)**

Exhibiting (in operation): Radiac Cut-Off Machine Type "K" cutting by the abrasive wheel method both wet and dry metals and other materials. Type "F" Radiac Bench Machine cutting various materials with an abrasive disc dry cutting. Type "C" Radiac Cut-Off Machine cutting various materials with an abrasive disc dry cutting. Display and demonstration of line of abrasive mounted points and stones used in connection with the small electric hand grinder and exhibit of small tool and cutter grinding wheels and abrasive cutting off discs.

**Detroit Testing Machine Co., Detroit, Mich. (Booth B306)**

Exhibiting (in operation): Hardness testers, new direct reading Brinell machine, new special direct reading Brinell for tubes, pipes or other compressible members, ductility or sheet metal testers, Universal testing machines.

In Attendance: RALPH CAMPBELL and FRED H. NASS.

**Dietert Co., Harry W., Detroit, Mich. (Booth C448)**

Exhibiting (in operation): A complete line of spectrographic equipment for qualitative and quantitative analysis of all metals, ores, and paints. Two minute carbon determinator and five minute sulphur determinator in operation analyzing carbon and sulphur content of various metals. Sand testing equipment for moisture, permeability and strength in operation.

In Attendance: HARRY W. DIETERT, president; EARL E. WOODLIFF, chief engineer; and JOHN A. SCHUCH, spectroscopist.

**Dow Chemical Co., The, Midland, Mich. (Booth C115)**

Exhibiting: Various manufactured products in which Dowmetal is used either entirely or in part, a miscellaneous assortment of Dowmetal sand and die castings, extruded shapes, sheet and plate.

**Electronic Control Corp., Detroit, Mich. (Booth D316)**

Exhibiting (in operation): A model Clearing press with curtain of light safety control, modern and approved curtain of light projector and receiver, radically new type of temperature control, and other varying Electronic equipment for inspection, grading and sorting.

In Attendance: F. D. BENTLEY and L. A. ROVELSKY, sales engineers; H. T. LATHROP, and R. A. POWERS.

**Firth-Sterling Steel Co., McKeesport, Pa. (Booth A217)**

Exhibiting (in operation): The display includes all types of Firth-Sterling stainless steels, Globe drill rods and wire. Firth-Sterling tool steels, die steels. Many types of Firthite Cutting Tools, and many non-Standard Firthite tools of very recent design. Several types of Firthaloy wire drawing dies, tube drawing dies, etc. As well as all types of wear resisting parts.

**General Electric Co., Schnectady, N. Y. (Booth A109)**

Exhibiting (in operation): A-C. and D-C. welders including several sets of brand new design. Complete line of welding accessories. Comprehensive exhibit of industrial products manufactured through the use of copper brazing, bright annealing, and scale-free hardening—all performed in G-E electric furnaces. A dramatic exposition of the facts about electric heat for industry.

In Attendance: L. D. MEEKER, manager welding sales; B. C. TRACEY, E. VOM STEEG, H. O. WESTENDARP, and DAVID CRAMB, welding specialists; C. L. IPSEN, manager industrial heating sales; H. M. WEBBER, and R. M. CHERRY, commercial engineers industrial heating; E. W. CUNNINGHAM, H. E. SCARBROUGH, F. H. HILL, and R. F. NEWELL, industrial heating specialists.

**General Electric X-Ray Corp., Chicago. (Booth A109)**

Exhibiting: Latest oil-immersed, shock-proof industrial x-ray unit with radiographs.

In Attendance: G. E. SIMONS, E. W. PAGE, and H. I. NELSON.

**Handy & Harman, New York City. (Booth A525)**

Exhibiting: This year the Handy & Harman booth will again feature low-temperature brazing. The main attraction will be a high-pressure steam boiler used by the New York Central R. R. for heat and hot water on their electrified trains. In this boiler 1237 copper tubes are joined to steel headers by the low-temperature brazing alloy Easy-Flo—2474 joints in all. A series of slides will show the brazing process. Many other samples of work done with Sil-Fos, Easy-Flo and Handy Flux will be displayed. Actual demonstrations of joining ferrous and non-ferrous metals with these alloys will be carried on continuously. Silver-clad plate and powdered metals containing silver will also be shown.

In Attendance: T. H. GALLAGHER, Chicago office (sales); A. W. SWIFT, Chicago office (sales); FRED PETRIE, Bridgeport plant (laboratory); H. A. FOLGNER, New York office (sales); LEO EDELSON, New York office (sales); and F. T. VAN SYCKEL, New York office (sales).

**Harnischfeger Corp., Milwaukee, Wis. (Booth A250)**

Exhibiting: P&H-Hansen welders and Smootharc welding electrodes. The welders will receive special emphasis with a model of the P&H-Hansen "Special" trailer welder, newly introduced. "Sammy Smootharc" will again be hard at work at the booth illustrating the ease and simplicity of welding with P&H-Hansen welders. Smootharc welding electrodes will also share the spotlight—part of the booth being made up to look as if it were a huge replica of the new airtight containers in which all Smootharc electrodes are now packed. Also on display, to illustrate the water-tightness of the new can, will be a large aquarium in which cans of Smootharc electrodes will be submerged and subsequently opened to prove their water-tight quality.

Harnischfeger Corp. also plans to show two practical and modern ways of positioning welded parts—the P&H Zip-Lift hoist and the P&H R-1 Variable Speed "Hevi-Lift" hoist.

**Haynes Stellite Co., Kokomo, Ind. (Booth B216)**

Exhibiting: This manufacturer of Haynes Stellite metal-cutting tools and hard-facing rods and Hastelloy corrosion-resisting alloys, will occupy exhibit B216. Foremost among the Haynes Stellite displays will be valves for high-temperature, high-pressure steam service. These valves—all standard products of well-known valve manufacturers—have their seating surfaces protected by Haynes Stellite trim which imparts to them long, trouble-free life. Hastelloy alloy valves for handling corrosive acids and chemicals will also be shown.

The red hardness and wear resistance of Haynes Stellite will be demonstrated by a simple file test. The corrosion resistance of Hastelloy alloys will be demonstrated by apparatus in which Hastelloy alloy B is subjected to the action of boiling hydrocloric acid. Other uses of these wear- and corrosion-resistant products will be demonstrated by transparencies and by static and automatic displays.

**Hobart Brothers Co., Troy, Ohio. (Booth C208)**

Exhibiting (in operation): Demonstrating arc welding equipment. A complete line of the new Hobart "Multi-Range" arc welders with continuous demonstrations of such features as "1,000 volt-ampere combinations," remote control, "Motor Horsepower Control," etc. Samples of typical welded joints and other welding applications involving various kinds of ferrous and nonferrous metals.

Visitors are invited to actually use this revolutionary new welding machine. Equipment on display includes models powered by electric motors and gasoline engines as well as generators only for use with customers' own power units.

In Attendance: ROY SMITH, district sales manager; E. A. HOBART, president; W. H. HOBART, vice president; O. H. MENKE, factory manager; W. J. CHAFFEE, welder sales manager; E. K. BUTTERFIELD, welder sales; R. C. BERCAW, welding demonstrator.

**Hollup Corp., Chicago, Ill. (Booth B252)**

Exhibiting: Will have sales engineers and service engineers present to answer any technical questions that may arise. Also contemplate having a revolving display, exhibiting Hollup Corp. products.

In Attendance: O. L. HOWLAND, sales manager; R. E. LONG, chief engineer; A. M. CANDY, consulting engineer, and E. J. BRADY, sales engineer.

**International Nickel Co., Inc., New York City. (Booth C226)**

Exhibiting: Background will consist of a large graph, the ordinates of which will represent the approximate nickel content of 25 alloys containing nickel. These will vary from 99.95% nickel on the high side to ½% nickel on the low. Directly under each of the ordinates will be an illuminated box for display of a typical specimen.

In Attendance: Members of the Development and Research Division, Nickel Sales Department and Monel and Rolled Nickel Department will be in attendance at the booth to consult with visitors on metallurgical problems involving the application of nickel alloys.

**Jackson Electrode Holder Co., Detroit, Mich. (Booth D312)**

Exhibiting: Insulated and non-insulated arc welding electrode holders. Eyeshields for acetylene welding and cutting, grinding and chipping operations and general eye protection.

In Attendance: H. A. JACKSON, L. H. SADLER, B. C. LEE, R. N. JACKSON, and R. MARSHALL.

**Jessop Steel Co., Washington, Pa. (Booth C441)**

Exhibiting (in operation): Individual showcases demonstrating the evolution of:—(a) composite knife stock and finished blade (b) a high speed steel hacksaw and (c) a stainless steel knife. A fourth showcase containing miniature reproductions of Jessop products.

Special stress is given to Jessop Silverbond composite stainless steels. Various tests such as reverse bend tests, twist tests, fracture tests, tensile tests are at hand to indicate the strength of the welded condition, also samples of the various finishes and forms. Your attention is invited to the photomicrograph (composed of 60 separate photographs) of two pieces of Silverbond Clad stainless steel fusion-welded together.

**Krembs & Co., Chicago. (Booth C520)**

Exhibiting (in operation): A metal table and some gas, both oxygen and liquefied petroleum and some welding equipment to make demonstrations of brazing, welding and soldering.

In Attendance: OTTMAR M. KREMBS, president; C. P. FEEBUSCH, engineer; R. J. FRANK, manager; and W. R. KREMBS, advertising manager.

**Krouse Testing Machine Co., Columbus, Ohio. (Booth C407)**

Exhibiting (in operation): Repeated stress testing machines of the following types: High speed, rotating beam, rod and wire, sheet and plate.

In attendance: G. N. KROUSE, president; J. P. KROUSE, engineer.

**Leitz, Inc., E., New York. (Booth C528)**

Exhibiting (in operation): Large Micro-Metallograph MM-1, latest model, for observation in ordinary incident light, polarized incident light, and dark field. Simplified Micro-Metallograph MM-2, with combination illumination unit arc lamp—incandescent light source. Universal Metallurgical Microscope "Panphot" of most recent design. Dilatometer, automatic magnetic polishing machines, low power stereo binocular microscopes, and various types of microscopical accessories, for metallurgical investigation. Leica camera and accessories.

**Lincoln Electric Co., Cleveland, Ohio. (Booth A532)**

Exhibiting: Noteworthy advancements in arc welding equipment and procedure will be displayed and demonstrated. The Lincoln exhibit will feature various models of the latest "Shield-Arc S.A.E." arc welder, which has a positive arc control. "Shield-Arc S.A.E." welders will be in operation supplying current to both manual and automatic welding exhibits. The exhibit will also include the SA-150, a small machine of moderate price.

Latest developments in arc welding electrodes will be shown and demonstrated. The newest will be "Softweld" for depositing a soft machineable layer on cast-iron to fill up defects, etc. Included, also will be two new "Fleetwood" electrodes developed to meet specific demands for welding mild steel: (1) "Fleetwood 8," which eliminates necessity of multi-pass welding in production of fillet and lap welds in many applications, and permits production of such welds without undercutting or overlap, and (2) "Fleetwood 9," which provides welds of high quality in flat welding of deep-groove joints. In addition to "Fleetwood 8" and "Fleetwood 9," the electrode exhibit will include "Aerisweld" for welding bronze, brass and copper; "Chromeweld 4-6" for 4-6 chrome-steel; "Toolweld" for tools and dies; and various other Lincoln electrodes for high manganese steel, high tensile steel, sheet metal, stainless steel, cast-iron, aluminum, etc.

As part of the arc welding exhibit, there will be demonstration of the "Linconditioner," a machine developed by Lincoln for filtering dust and smoke from the air in the vicinity of welding and machining operations. Completing the exhibit will be a full line of electrode holders, welding cable, helmets, protective shields, safety clothing, etc. In addition to the arc welding display, the company will show latest models of its "Linc-Weld" motors.

In Attendance: J. F. LINCOLN, president and general manager; C. M. TAYLOR, vice president and sales manager; A. F. DAVIS, vice president and secretary; F. M. MAICHLE, manager Detroit office; R. D. LAYMAN, manager Grand Rapids office; G. E. TENNEY, manager Chicago office; J. W. SUGARS, manager Toledo office; J. F. CUNNINGHAM, F. E. BOUCHER, H. OLDENKAMP, M. S. SCHONVIZNER, and R. DALZELL, sales engineers; and V. PETERS, welding technician.

**Linde Air Products Co., The., New York City. (Booth B221)**

Exhibiting: The exhibit of The Linde Air Products Co. will emphasize the wide scope of oxy-acetylene applications that have been developed or improved within recent years. Actual demonstrations of machine-cutting, flame-hardening, and flame-softening will be shown, together with a display of oxy-acetylene welding and cutting equipment. Of particular interest will be a display of the Unionmelt welding process, the new electric welding method developed by Linde.

**Macklin Co., Jackson, Mich. (Booth A415)**

Exhibiting: Back wall, side wall, miniature swing frame grinder operating display of grinding wheels.

**Magnaflux Corporation, New York City. (Booth C109)**

Exhibiting: Magnaflux method of inspection, which is a non-destructive and rapid method for determining defects in steel and steel parts, will be demonstrated on the latest designed magnaflux units. These are the type employed in the automotive, aircraft, railroad and welding industries, as well as in the general industrial fields. Various specimens from all of these industries will be exhibited.

In Attendance: A. V. DEFOREST, president; F. B. DOANE, vice-president and treasurer; C. A. MCCUNE, secretary, and C. E. BETTS, technical director.

**Magnetic Analysis Corp., Long Island City, N. Y. (Booth A213)**

Exhibiting (in operation): One magnetic analysis 3 in. dual method equipment.

**Mallory, P. R., & Co., Inc., Indianapolis, Ind. (Booth A437)**

Exhibiting: All standard types and sizes of resistance welding electrodes—spot welding tips, seam welding wheels, projection welding plugs, flash and butt welding dies—and water-cooled holders. Mallory electrical contacts and contactor materials—tungsten, silver, molybdenum, Elkonite and special alloys—for every requirement where an electrical circuit must be made or broken. Castings, forgings and finished machined parts of Mallory non-ferrous alloys recommended for applications requiring material of high electrical conductivity and extreme hardness and wear resistance.

In Attendance: J. W. Weiger, vice-president and sales manager; J. D. Tebben, sales manager Detroit district; Clifton Taylor; Dr. F. R. Hensel, consulting engineer, and P. Newton Cook, advertising manager.

**Maurath Inc., Cleveland, Ohio. (Booth A426)**

Exhibiting: Stainless steel and corrosion-resisting arc welding electrodes.

In Attendance: George A. Maurath, Floyd C. Whitmer, Phyllis M. Yarans and H. D. Leverett.

**McKay Company, The, Pittsburgh, Pa. (Booth C548)**

Exhibiting: McKay arc welding electrodes and chain for industrial purposes.

In Attendance: J. C. McKay, vice-president; M. J. Van Dreser, welding engineer; C. E. Briner, chief engineer, and R. C. Fairlamb, Jr., sales representative.

**Metal & Thermit Corp., New York City. (Booth B502)**

Exhibiting: Will exhibit a complete line of Murex electrodes for manual arc welding. Murex Fillex, a new electrode for high-speed fillet welding and other down-hand work, will be featured. A welding booth will permit trials and demonstrations of electrodes. In addition to electrodes, the Thermit process and its applications for rail welding and repairs to heavy equipment will be shown, as will the M. & T. line of "Carbidefree Metals and Alloys."

In Attendance: John B. Tinnon, J. H. Deppeler, C. D. Young, H. T. Thompson, M. L. Smith, J. C. Honhart, E. J. Knapp, J. Plaskon and R. L. Browne.

**National Cylinder Gas Co., Chicago. (Booth C118)**

Exhibiting (in operation): The National No. 646 oxy-acetylene shape cutting machine. This model of the National has a rectangular cutting range of 6 feet wide by 4½ feet long. It cuts any thickness of plate within the present limits of the cutting torch. It has several exclusive features, resulting in greater production per hour and reduced total cutting costs. New and improved oxy-acetylene apparatus for flame hardening shafts.

In Attendance: F. A. Wirth, E. C. Stone, and O. B. Haley, Detroit; Roy Hinger, Cleveland; Chester Mott and H. C. Dowson, Chicago.

**National Electric Welding Machines Co., Bay City, Mich. (Booth A307)**

Exhibiting: New style 200 Series double roll knurl driven seam welder (for circular seams), together with new style General Electric seam welding thyratron control panel. Also standard 100 Series motor-operated press type projection welder, together with new style Westinghouse Weld-O-Trol (tube type contactor). Also special General Electric one-half cycle thyratron welder equipped with National bench type welding head. Also a very complete display of welded samples.

In Attendance: E. C. Smith, president; J. R. Brueckner, vice-president; C. E. Shearer, secretary-treasurer (sales manager) in charge of exhibit. Also L. E. Nichols, chief welding engineer; H. C. Cogan, chief engineer; C. F. Kaunitz, chief designer, and S. Fisher, welding engineer.

**National Carbide Corp., New York City. (Booth B515)**

Exhibiting: National Carbide lights and lanterns.

**National Tube Co., Pittsburgh, Pa. (United States Steel Corp. Subsidiary). (Booth B121)**

Exhibiting: Seamless and welded tube and tubular products in carbon and alloy grades, tests and test data, examples of applications. See also "United States Steel Corp. Subsidiaries."

**New Jersey Zinc Co., New York. (Booth B106)**

Exhibiting: Zinc alloy die castings in the raw and finished state. A wide assortment of finished products in which these castings are used including electrical appliances, business machines, small tools and hardware. A comprehensive group of new and unusual automotive applications of zinc alloy die castings.

A feature is a revolving turret on which is mounted the radiator grilles used by Oldsmobile from 1935 through 1939. These grilles are all die cast and afford an excellent case history. The four main characteristics of zinc alloy die castings—Strength, Accuracy, Complexity, Economy—are dramatized by photograph murals on the back wall of the booth.

**Norton Co., Worcester, Mass. (Booth A242)**

Exhibiting: Abrasives, grinding wheels, rubbing bricks and refractories of the types generally used by the steel industry. New types of diamond wheels and the latest advances in the manufacture of Norbide (Norton Boron Carbide) gauges and accessories.

**Tinius Olsen Testing Machine Co., Philadelphia, Pa. (Booth B412)**

Exhibiting (in operation): Latest design Universal testing machine. New (first showing) direct reading automatic Brinell hardness tester. (Production type). New automatic ductility tester. New design high magnification recorder. Full line of stiffness testers.

**Pyro-Electro Instrument Co., Detroit, Mich. (Booth C534)**

Exhibiting (in operation): Hardness testing instruments, manual and power operated. In addition to the standard line of Rockwelling and Brinelling instruments there is on exhibit for the first time anywhere two new models: Model "HT" horizontal internal hardness tester. Model "PR" for Rockwelling and Brinelling in volume production.

**Robinson Welding Supply Co., Detroit, Mich. (Booth A543)**

Exhibiting: Arc welding and acetylene equipment and supplies.

In Attendance: J. M. Robinson and R. M. Hannum.

**Ryerson & Son, Inc., Joseph T., Chicago. (Booth B-406)**

Exhibiting: Exhibit explains "Certified Steel" with particular emphasis on the unique alloy steel quality control plan. It consists of a background panel with pictures and illuminated flasher sign. Also table for product display and furniture.

**Titanium Alloy Mfg. Co., Niagara Falls, N. Y. (Booth A212)**

Exhibiting: Samples of ferro titanium and zirconium alloys. Samples of foundry zircon sand and flour. Steel, iron, and aluminum castings. Zircon refractories.

**Una Welding, Inc., Cleveland, Ohio. (Booth A432)**

Exhibiting (in operation): Two welding machines, one automatic welding head, one Una taper, samples of welds, samples of electrodes for manual welding, samples of various kinds of tape for automatic welding, and raw material for demonstrating welding.

In attendance: W. B. Baker, general manager; P. J. Cella, engineer; Jack Vogler, welding engineer; and R. B. Fehr, chief engineer.

**United States Steel Corp., New York City. (Booth B121)**

Exhibiting: Will have a joint exhibit for the American Steel and Wire Co., Carnegie-Illinois Steel Corp., Columbia Steel Co., National Tube Co., Scully Steel Products Co., and Tennessee Coal, Iron and Railroad Co. A central structure will provide two large interior booths within the display, one containing a 50-seat theatre where the 4-reel technicolor movie, "Steel, Man's Servant" and an industrial film describing the manufacture and uses of the high-tensile, corrosion-resistant steel, Cor-Ten, will be shown several times daily. The opposite space will feature graphically some of the newer concepts of hardenability which will be discussed at the Technical Sessions, together with a special exhibit of the austempering process.

The four wing walls of the central structure will consist of wide sheets of cold finished steel with a border of stainless steel strip, sweeping in from coils at the four corners to a central passageway through the booth. From the gleaming steel surfaces will appear a streamlined train, a tractor, a bus, and an automobile in attractive bas-relief. The walls of the passageway furnish space for attractive dioramas symbolic of the manufacture and uses of steel. Special displays of Cor-Ten and Man-Ten, will illustrate the tests to which these steels are subjected.

The austempering exhibit will illustrate the process, which fundamentally consists of raising the carbon or low-alloy steel to the desired temperature, preferably in a controlled atmosphere, and then quenching it in a molten salt or metal bath for a predetermined length of time, thereby achieving high hardness combined with an exceptional degree of ductility. Examples of austempered products will be shown, as well as tests. Steel wires, hard enough to scratch glass, yet sufficiently ductile to be bent on a two-diameter radius, and other wires having a hardness of 50 Rockwell C, yet capable of being bent around a single diameter, indicate the possibilities of this process.

This process, which to date is restricted to approximately ¼ in. thickness in carbon steel and ½ in. in alloys, greatly extends the possibilities in steel uses. The high hardness connotes a high elastic limit and a high degree of spring-back. The extra toughness conferred by the process of austempering prevents breaking even though the austempered product is deformed well beyond its high elastic limit.

**Wall-Colmonoy Corp., Detroit, Mich. (Booth 441)**

Exhibiting: Hard-surfacing alloys, welding rods, welding equipment, welding electrodes, oxygen, acetylene, and general welding supplies.

In Attendance: F. G. JONES, sales manager; N. W. COLE, L. V. LAROU, and R. S. ANDERSON.

**Welding Engineer Publishing Co., The, Chicago. (Booth B310)**

Exhibiting: Copies of the September, 1938, Metal Show issue of *The Welding Engineer*. Also copies of the new Ninth Edition of The Welding Encyclopedia.

In Attendance: RALPH S. KENRICK, editor; M. S. HENDRICKS, promotion manager; T. E. DEPEW, Eastern representative; and L. C. MONROE, Western representative.

**Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa. (Booth C132)**

Exhibiting: Line of A-C. Flexarc welders including midget, junior, 150, 350, 500-amp. sets; display of A-C. welding electrodes; a 200 and 300-amp. motor-generator set; automatic welding equipment in operation; display of alloys including phos-copper, Cupaloy, Kovar and Konal; samples of the new brazing applications in the electric furnace; a Weld-o-trol for timing spot and resistance welders; splash-proof motor, dust-proof motor, and DA circuit breaker (for applications less than 600 volts).

In Attendance: W. R. BERNARDI, E. H. VEDDER, J. F. KELLY, W. W. REDDIE, R. W. STAGGS, J. H. GERMANY, T. SIMPERS, L. M. GUMM, O. G. RUTEMILLER, C. D. PENCE, P. H. GRUNNAGLE, and J. B. SEASTONE.

**Wilson Welder & Metals Co. Inc., New York City. (Booth B515)**

Exhibiting: Will show a Wilson 300-amp. motor-generator set and the Yellow Jacket machine which was introduced early this year for use in pipe line work.

**Wilson Mechanical Instrument Co., Inc., New York. (Booth C442)**

Exhibiting (in operation): "Rockwell" Hardness Tester and accessories, and "Rockwell" Superficial Hardness Tester and accessories.

## Sewage Gas Stored In Spherical Pressure Holder

★ A pressure gas holder, said to be a comparatively new type for storing gases generated by decomposition of sewage, has been completed at the Cuyahoga Heights plant of the $14,000,000 sewage disposal project of the City of Cleveland, Ohio.

The holder is a 57½-ft. diameter arc welded sphere having a capacity of 200,000 cu. ft. of free gas at 29 lbs. operating pressure. The design and method of construction made it possible to obtain the required capacity in a structure which is considerably smaller than would be the case with other types of holders.

The purpose of the holder is to store gas produced in excess of normal consumption and to "pay out" deficiencies as required. The sphere floats on the line in much the same manner as an elevated tank in a water system. The surplus gas in the sphere will be compressed and paid out into the service lines as needed for laboratory, boilers and two 400 hp. gas engines. In normal operation of the plant, with the sphere off the line, gas is generated at a pressure of approximately 20 in. of water which is sufficient to supply the engines and boilers. Generation of gas is by natural decomposition, accelerated by controlled digestive elements.

The designers of the disposal project, George B. Gascoigne and Associates, Cleveland, liken the sphere's form to a bubble, nature's example of a structure having uniform stress in every part. The holder was fabricated by the Chicago Bridge & Iron Co., Chicago, Ill., by the electric arc process of welding, using Lincoln "Fleetweld" shielded arc type electrodes.

In constructing the sphere, steel plate was cut and formed in such a way as to provide the desired shape when the pieces were assembled together. Plate edges were scarfed to assure complete penetration of welds. All joints, were butt welded from both sides. Where more than one bead of weld metal was applied, each bead was scraped, wirebrushed and peened before application of the next.

All welders employed in construction of the holder were qualified in accordance with the U-69 qualification tests of the A.S.M.E. code for unfired pressure vessels.

**Like a bubble, this structure has uniform stress in every part. It is an arc welded pressure gas holder recently completed in Cleveland, Ohio.**

# New Product Developments

## A Dressing Tool for Spot Welding Tips

★ Metallurgical Products Co., 2950 Penobscot Bldg., Detroit, Mich., has recently developed a novel dressing tool for spot welding tips. The device consists of a 9-in. chrome-plated ratchet handle and a double-sided cutting tool with ground teeth. The construction is simple, the only other parts being a ratchet key wtih compression spring and a cover plate attached by two screws. Although the cutter is durable it can be replaced at reasonable cost.

This tool offers the welder speed and convenience in the dressing operation. It removes the mushroom on the electrode with the greatest economy of metal and dresses the tips uniformly. The convenience of this device makes for more frequent dressing of tips, with a resultant saving by elimination of welding failures. A tool with finer teeth (cutting edge on one side only if desired) is available for gun welders.

» «

## Wilson Introduces 100-Amp. Motor Generator Arc Welder

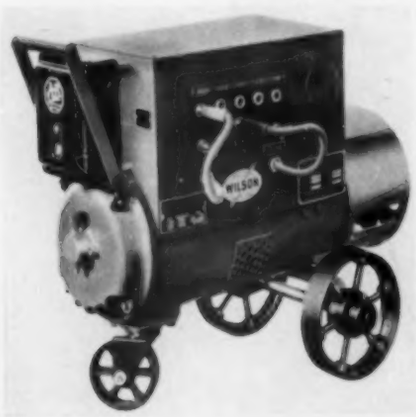
★ The Wilson Welder & Metals Co., Inc., 60 East 42nd St., New York City, has announced the newest addition to its comprehensive line of machines—the Model SC, single operator 100-amp. motor generator arc welder. The machine is extremely compact and is designed primarily for light gage work, operating very satisfactorily on the thinnest material that can be arc-welded. Suitable for fender repair work in garages and service stations.

Worth noting are the following features:

(1) Adjustment of the output of generator is accomplished by 5 marked receptacles with plugs for current or heat control and a multi-point field rheostat for adjustment of the open circuit voltage.

(2) The generator is of special design and will provide unvarying welding heat. It is of two bearing construction, operating at a speed of 1800 r.p.m.

(3) The rheostat is equipped with a dial and pointer so that the machine can be easily reset for any previously used current value.

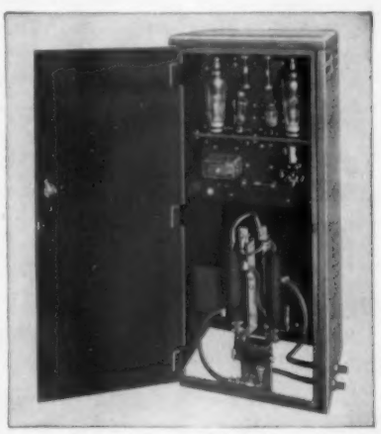



**Wilson Model SC 100-amp. arc welder for thin gauge work.**

» «

## Inexpensive Ignitron Welding Timers

★ Continued improvements of ignitron tubes and simplified circuits and construction have resulted in an inexpensive Westinghouse ignitron spot welding timer, Type SP-11. This timer will mount two sizes of ignitron tubes. On low-duty cycles, the WL-652 tube will carry 1500 amp. at 220, 440 or 550 volts, while the WL-651 will carry 2800 amp. at 440 and 550 volts or 4300 amp. at 220 volts. The current rating is decreased at higher duty cycles above about 3.5 per cent. Ignitron timers provide high accuracy of control. They are adjustable to pass current for any exact number of cycles from 1 to 15. For longer times, the SP-11-A is adjustable from 1 to 30 cycles. Welding machine current starts and stops at current zero eliminating line current transients.



**Westinghouse Ignitron spot welding timer.**

» «

## "Z" Nickel—New High Strength Corrosion-Resistant Alloy

★ Heat treating which has been used so successfully in the production of high strength alloy steels is now being applied to a nickel alloy which—in addition to the mechanical properties of such steels—has the corrosion resistance of nickel. While this new material is an alloy, it contains 98% nickel.

Introduced as "Z" Nickel, the alloy has a strength of from 2½ to 4 times that of ordinary structural carbon steel. It has been produced with a tensile strength as high as 250,000 psi. and hardness values as high as 46 Rockwell C. In its unhardened or annealed condition, it fabricates almost as easily as pure nickel. Such operations as bending, drawing, machining, and hot forging are accomplished readily.

The metal can be heat treated after fabrication with little if any distortion, since heat treating operations are carried out at low temperatures—890 deg. F. to 930 deg. F. for 6 to 16 hr. Further information regarding "Z" Nickel can be obtained by writing to International Nickel Co., 67 Wall St., New York City.

» «

## Metco Type E Metallizing Gun

★ The Type E Metco metallizing gun was developed to meet the constant demand for a faster, more reliable and more economical metallizing equipment. It has improved spraying characteristics. Extremely fine coatings are obtained at production speeds, and this combined with simplified adjustments, permits continuous operation with maintained speed and quality. Improved nozzle and jet construction reduce gas consumption and result in deposit of a maximum amount of metal sprayed. Light weight (3¾ lbs.), perfect balance and easy hand grip, combine to eliminate operator fatigue. A multiple-jet turbine makes instantly available two complete speed ranges, which cover all speeds necessary for commercial metals. Adequate power is available without changing gears. Operates equally well from acetylene tanks or generators at the maximum recommended pressure of 15 lbs. Only 60 lbs. air pressure is required. The gun has been tested and approved by National Board of Fire Underwriters.

**Metco Type 1 metallizing gun weighs only 3¾ lbs.**

The metal wire is automatically fed into the gun at an adjustable speed, where it is melted by means of oxy-acetylene or oxy-hydrogen flame, atomized by compressed air and sprayed on any base material. The gun may be used as a hand tool for coating large structures with zinc, aluminum, lead or other metals, or as a lathe tool for building up worn shafts, rolls, plungers, etc., with steel, stainless steel, monel metal, bronze or any other metal obtainable in wire form.

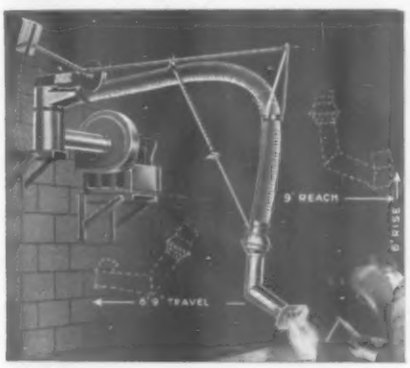
The gear case is made of heat-treated Dowmetal and is completely sealed. Simple two-piece case construction combined with removable drive gear and roll make the unit easy to clean and inspect. Precision ball bearings are used throughout. Bearing housings of brass are mounted in the case. All parts affecting alignment are assembled with dowel pins or cylindrical fits. Worms are cut integral with their shafts and are ground after hardening. Wire nozzles are of bronze with a hardened, heat-proof lining. Gas head is made of a dense pressure tight bronze, and separated completely from case assembly, eliminating any danger of inflammable gases collecting in the case. All parts are completely interchangeable.

Further information may be secured by writing to Metallizing Engineering Co., Inc., 44 Whitehall St., New York City.

» «

## Welding Fume Collector

★ A new fume collector designed to remove the irritating gases, smoke and heat caused by arc welding is announced by Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis. Such modern ventilation by means of local exhaust hoods has proven practical in service as it collects the fumes at the source of generation, instead of exhausting the entire shop atmosphere. Such fumes are exhausted outdoors. It is claimed that no filtering unit is known to eliminate dangerous gases.




**Arc welding fume collector.**

The Ruemelin fume collector will cover a 9 ft. semi-circle with ease. There is also available a hinge type collector providing a reach of 16 ft. from the building wall so that practically every welding operation can be provided with adequate ventilation.

The inlet snout is automatically supported in any required working position, and can be instantly adjusted to a new position without loss of time. Collecting fumes at their source is the most efficient method known, consuming less power. Use of this device increases operator's comfort and efficiency in production.

It is stated that more than 1000 Ruemelin collectors are in use today for collection of dust and fumes. They have been proven practical by the rigid test of hard, daily usage. The Ruemelin Mfg. Co. offers Bulletin 37-B upon request, as well as engineering and installation data on fume collection problems.

## Thomson Model "B" Spot Welder

★ A recent addition to the Thomson-Gibb line of production welding machinery is the Model "B" spot welder. This unit was developed in answer to the demand for a popular priced, yet practical and durable, spot welder for handling medium duty work in sheet metal and general welding shops.

**Model B spot welder for medium duty service.**

Model "B" is a sturdy machine, capable of high production within its capacity range and is so simple and fool-proof in design that it is claimed that no experience is required to operate it. Both pressure and current are applied by the foot treadle which actuates the upper welding arm through a pressure spring and back bar. A switch mounted on the back bar controls the welding current.

» «

## Metal Coating to Prevent Adhesion of Weld Spatter

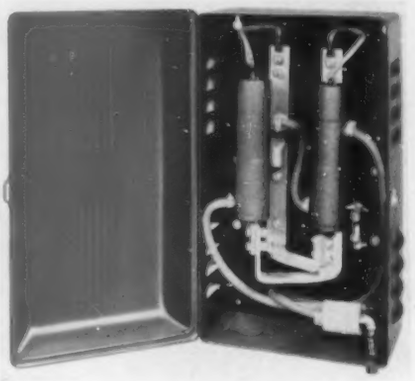
★ Wayne Chemical Products Co., Copeland St. & M. C. R. R., Detroit, Mich., has introduced a metal coating which it is claimed will prevent adhesion of welding spatter. This new product is water soluble and of a light jelly consistency for application with brush or spray.

It should be applied to parts adjacent to welds and will protect them from adhesion of welding spatter. Customers who have used it claim that it does not weaken the weld and say that it can even be applied on the area to be welded. As it contains water and is water soluble, the coating quickly cools the hot sparks and prevents their bonding to the metal. The coatings may be washed off with hot water or metal cleaner.

» «

## Low Cost Electronic Welding Contactor

★ For welding mild steel products and other readily-welded metals, a new "Weld-o-trol" electronic power switch for controlling the primary of welding transformers and suitable for use with existing timing devices, is announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. With either sealed-off or continuously pumped ignition tubes, the Weld-o-trol offers an instantaneous power switch for producing uniform welds, and is free of moving parts, arcing contacts and noise. Available ratings, are roughly equivalent to 300 and 600 amp. conventional welding contactors.



**Weld-o-trol electronic power switch for controlling primary circuit of welding transformers. No moving parts, no arcing contacts, low maintenance and longer welding-tip life are among the claims made for it.**

The Weld-o-trols equipped with sealed-off tubes consist of a sheet metal cabinet in which are mounted a bus bar assembly, electrical connections and a flow switch. The assembly is of the same general construction for all tube ratings, but has copper and construction suitable for the current ratings involved. The only electrical connections required are: one power cable entering the unit and one leaving the unit—the Weld-o-trol acting as a single-pole, single-throw switch—and two control leads from the timer. No added control voltage is required, as the Weld-o-trol contains all necessary voltages for operating it.

A water flow relay insures not only adequate water pressure, but insures an actual flow of water through the ignition tube and provides protection against either water failure or stoppage of the drain line. About two gallons of water per minute are required for the sealed-off type while the pumped-type requires slightly more water. The Weld-o-trol assembly, with sealed off tubes, is available either open or enclosed. The open type has all features that are in the enclosed type. The open type is recommended for those applications requiring that the assembly be mounted inside a welding machine or with other auxiliary control.

It is impractical to give a continuous current rating as has been applied to welding contractors and which will cover adequately the proper rating for the Weld-o-trol. However, as a rough approximation, the WL-652 and WL-657 tubes give a rating for spot welding approximating that of a 300 amp. contactor, while the WL-651 and WL-656 tubes roughly approximate the rating of a 600 amp. contactor. The rating of the continuously pumped Weld-o-trol is such that it

will handle applications previously almost impossible because of difficulty of switching the welding machine current.

» «

## Two New High-Speed Air Control Valves

★ Two new solenoid controlled air valves have been announced by the Ross Operating Valve Co., 6477 Epworth Blvd., Detroit, Mich. Both of these units are especially designed for high-speed service such as that required for resistance welding operations. One of these units is for the control of sin-

**Ross solenoid controlled air valve designed for high-speed service.**

gle-acting and the other for the control of double-acting cylinders.

The poppet principle employed in their standard line is retained in both the single and double acting models—compactly designed and light in weight to meet this particular type of service. Made in ⅜ in. pipe size. Available in all standard current characteristics.

The manufacturer claims that the utilization of air line pressure for reversing the valve action is an unusual feature; elimination of return springs makes possible the use of smaller solenoids.

Simple, sturdy construction throughout, with easy access to all working parts, makes these valves especially adapted to production operations where serviceability together with rapid interchanging of parts is of major importance. Valve proper or solenoid is removable by simply loosening four bolts.

» «

## "O.M.W." Shape-Cutting Machine

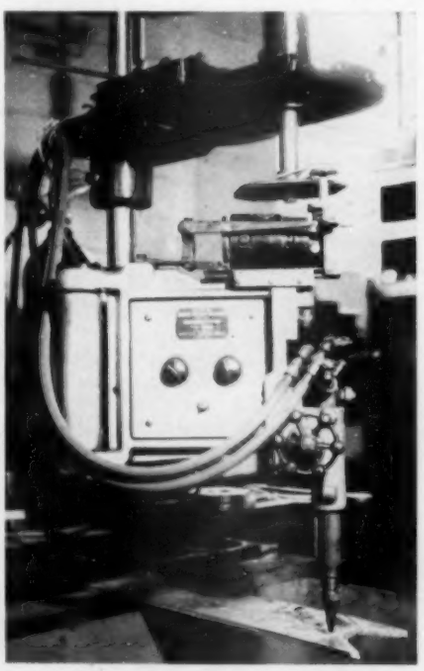
★ This shape-cutting machine combines the desirable features of both stationary and portable machines. It can be carried from cut to cut or, if more convenient, work can be brought to the machine. The use of high-strength aluminum alloys makes the machine stable and rigid under all conditions. Oversize anti-friction bearings are used in the aluminum alloy arms and are completely sealed from foreign material. All controls are conveniently located for the operator. Cutting speed is varied by adjusting rheostats on the control panel. The cutting range is 56 in. lengthwise and 24 in. laterally.

Ohmstede Machine Works, 897 N. Main St., Beaumont, Tex., is the manufacturer. An important feature of this machine is the ability to duplicate pieces cheaply, as the cost of the templet is negligible. Through use of simple, inexpensive plywood templets, it is possible to turn out work of such uniform accuracy that, in many instances, no further finishing is necessary.

The templet, made from ¼ in. plywood, is fastened to the templet mandrel. This templet acts as the guide for the spiral cut roller which controls the movement of the blowpipe through the medium of two pivoted arms. The blowpipe and motor are both rigidly attached to the outer end of the second pivoted arm. A variable-speed universal type (110-volt, ac. or d-c.) motor rotates the roller. The roller may be held in contact with the templet either by hand or spring tension. Cutting speed range is from 2 to 22 in. per min.

In starting a cut, an off-setting device is provided so that no blemish will appear on the finished piece. The torch is first offset by either depressing or raising a lever that is located beside the motor. Moving the lever places the torch on either side of the finished line of cut. The metal is then pierced and the torch moved in the line of cut. When the torch reaches a point that is in axial alignment with the roller contacting the templet, the mechanism automatically locks itself, and the clutch that is between motor and roller is engaged and the roller proceeds along the contour of the templet.

Circles can be cut with a circle-cutting attachment furnished with the machine. A radius rod is furnished, one end of which can be inserted in the tracer wheel housing and the other end clamped at the desired radius. Straight lines can be automatically cut in any direction by the use of a straight line attachment. Net weight of complete machine is 274 lbs.

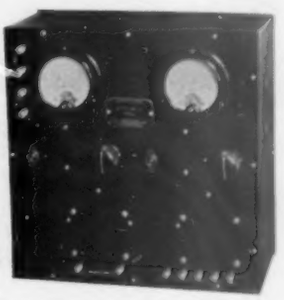


**"O.M.W." shape-cutting machine showing variable-speed motor, off-set lever and control panel.**

» «

## New Instrument Measures Time of Electrical Impulses

★ The time during which an a-c. circuit is energized is shown directly on meter scale in a new instrument known as the RayTimeR. It may be calibrated in either cycles



**Double unit RayTimeR for measuring time of a-c. current flow.**

or seconds and covers with equal precision excitation periods from 1/120th sec. to 30 sec., the accuracy being plus or minus 5%.

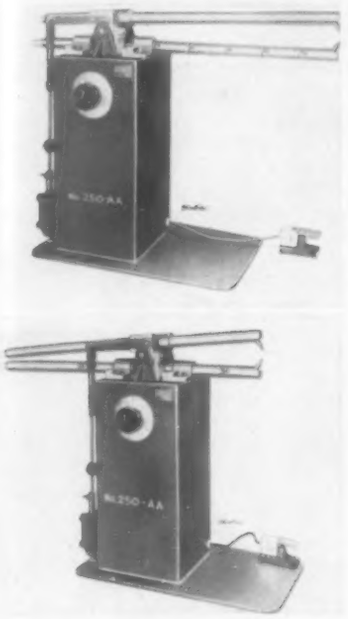
It is a simple electronic device with no moving parts, except the indicating pointer and no maintenance other than occasional replacements of the vacuum tube. The illustration shows a double unit having two RayTimeRs assembled in one container for convenience in measuring two different impulses simultaneously. Single-unit RayTimeRs are also made.

The RayTimeR may be used for checking welder and x-ray exposure timing, measuring closing and opening time of relays and contactors, measuring time periods and operating speeds of mechanisms. Major advantages claimed are accuracy, ease of reading, flexibility of application, portability and moderate cost. Full information may be obtained by writing to the manufacturer, Raytheon Mfg. Co., 201 Willow St., Waltham, Mass.

» «

## Universal Spot Welder With Horn Adjustments

★ The Eisler Engineering Co., 750 South 13th St., Newark, N. J. has placed on the market a Universal Long Horn Spot Welder for deep sheet metal work. The novel feature of the machine is that both horns, upper and lower, can be lengthened or shortened to the desired type and size of work. It is claimed that the horn adjustment makes it possible to weld light and heavy work and deep metal parts. The markings on the horn represent the kva. ratings—when the horn is placed on "25" it represents 25 kva., when horn is readjusted to "50" it represents 50 kva. The spot welders are made with many different styles of welding tips. The water cooling goes through the entire arm.



Universal spot welder has upper and lower horn adjustments.

Eisler spot welders are made foot, air or motor operated. They will weld from 30 to 150 spots per minute, depending on type of work. Universal spot welders are made in three types from 5 to 75 kva.

» «

## Simple Wide Vision Eyeshield for General Industrial Work

★ Safety engineers, and production men should be interested in a new eye protection device designed for general industrial use,

Jackson Type C eyeshield for general industrial work.

having the important advantages of lightness, wide range of vision, generous ventilation. The Jackson Type C Eyeshield consists of a flexible, transparent, non-inflammable visor obtainable in clear, smoked, light green, dark green or amber shades, adjustably hinged to a light headgear. No part of it rests on the nose or ears, making it comfortable to wear. It does not interfere with eye glasses. Ample ventilation eliminates fogging. Protection is afforded from front and both sides by the transparent visor, which can be economically replaced if necessary. Head band is equipped with removable sweat band.

This shield, introduced by the Jackson Electrode Holder Co., Detroit, Mich., provides protection for workmen engaged in soldering, flash, gun and spot welding operations, for welders' helpers, for general eye protection in industrial plants, for use in chipping operations and in many other cases where the workman's eyes must be protected from flying particles. A smaller eyeshield, Type D, available in the same shades, has a smaller visor, which fits the face more closely, yet has adequate ventilation.

» «

## Combination Unit for Arc and Spot Welding

★ A combination arc and spot welder, illustrated here, is announced by Miller Electric Mfg. Co., Appleton, Wis., as an addition to its present line of arc welders. The spot welder is built into the regular No. 2, and No. 3 welders, with capacities of 165 amp. for the No. 2 and 220 amp. for the No. 3. These units are designed to provide arc welders of ample capacity to handle elec-

Miller combination arc and spot welder.

trodes from 1/16 in. to ¼ in. They have 32 heat controls, enabling the operator to weld from light to heavy metal. With the addition of the spot welder the unit will handle all kinds of sheet metal work. The spot welder also has a number of heat controls for different thicknesses of metal. Special spot welding tongs, shown with the welder, are made in different styles to handle individual applications. It is stated that this new welder is patented in the United States.

» «

## Air-Vent Exhaust Fans

★ The Airtherm Mfg. Co., 1474 S. Vandeventer Ave., St. Louis, Mo., announces a complete line of Air-Vent, heavy duty, exhaust fans for general industrial, plant and office use. These fans have been especially designed to meet requirements for a heavy-duty type fan of simplified construction that would minimize installation and maintenance problems.

The manufacturer's claims for Air-Vent Fans include: low first cost, consistent with

Air-Vent heavy-duty exhaust fan.

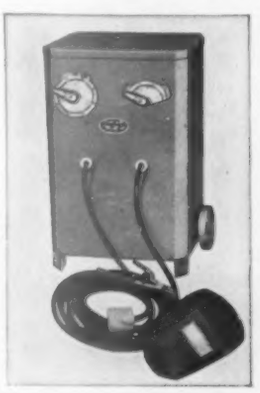
quality; dependable long life; economical in power-consumption; full rated capacity; ease of installation; and minimum maintenance cost. Other features include a special type of motor mounting, fully inclosed motors in all standard units, and pressure-proof type fan blades designed for minimum resistance to entering air.

Explosion-proof motor and aluminum blades can be supplied on all models. The Airtherm Co. also features design and construction of pent-houses to be used in conjunction with exhaust fan installation. Full details may be obtained by writing for Bulletin WE-98.

» «

## A-C Welder Uses Static High Frequency Current

★ A newly designed portable a-c. welder for heavy duty service has been announced by Giant Grip Mfg. Co., Oshkosh, Wis. This new model, illustrated here, has two dials



Giant Grip portable a-c. welder.

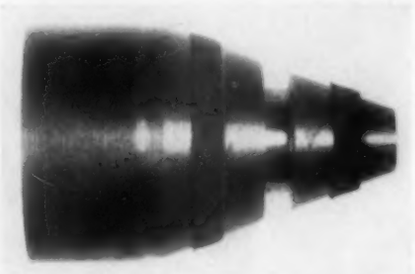
on the front of the cabinet, instead of a switch on the top or panel board. The construction includes a specially designed transformer, reactance control, static high-frequency current, a large number of heat

controls and a type of cooling which eliminates "hot spots" in the coils. Welding range is from 10 amp. up to maximum output, with constant open-circuit voltage which assures arc stability at all amperages it is claimed. This model is built in three sizes with capacities from 165 to 300 amp., weighing from 215 to 325 lbs.

» «

## Azolite Inserts for Cutting Torches

★ Roy Thomas, 1637 East Vernon Ave., Los Angeles, Calif., has developed an improved type of brass cone with an Azolite insert for use in oxy-acetylene cutting torches. As noted in the illustration, these Azolite inserts are small washers made of a material closely resembling rubber, but which is



**Small circular Azolite inserts fitted to tapered cone of cutting attachment.**

claimed to be chemically inert to most solvents and gases. These new inserts are adaptable to all cutting attachments which use a tapered cone. It is stated that these new cones eliminate gas leakage.

Azolite inserts are shaped to fit the taper of the cone and project slightly above the brass cone. When inserted in the welding head, the Azolite inserts are compressed forming a gas-tight seal.

» «

## Low-Cost Resistance Welding Process

★ General Electric engineers have developed a low-cost resistance welding process of an electronic type to replace soldering operations in the manufacture of such devices as radio sets, watches, small meters, industrial control devices, railway signal equipment, and business machines.

A current of several thousand amperes flows in the secondary circuit of the welder for a half-cycle which is precisely timed by an ignitron tube and its associated control circuit. This control circuit includes a dial for regulating the heat by the phase-shifting method. The amount of heat is accurately determined by the duration of current flow; maximum heat is obtained with a current duration of slightly more than 1/120 of a second. The welding transformer and its associated equipment are suitably enclosed.

On other electrical devices, as well as on radio sets, tongs are used with the equipment in the welding of solid or stranded wires to terminals. Likewise, a suitable bench welder can be utilized to weld small studs (.010 in. to .050 in diameter) to flat

**One-half cycle Thyratron-controlled spot welder and tongs.**

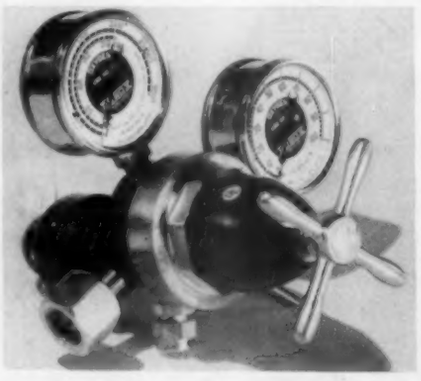
surfaces with little or no marking on the opposite side of the sheet of metal. Similar equipment is suitable for the spot-welding of thin sheets of various alloys with little or no oxidation or discoloration.

» «

## Purox Now Has Two-Stage Regulators

★ Three new Purox regulators bring to Purox users, for the first time, the advantages of two-stage regulation. These are known as: the Purox oxygen regulator, Type R-201 (for ordinary welding and light cutting); the Purox oxygen regulator, Type R-202 (for heavy-duty cutting); and the Purox acetylene regulator, Type R-203.

The new regulators have been designed with stem-type valve mechanisms that have all the refinements resulting from years of experience with similar regulators. They will deliver oxygen and acetylene with minimum fluctuation in pressure and in quantities sufficient for virtually all welding and cutting applications. They require a minimum of maintenance, and under normal operating conditions, the only readjustment ordinarily needed should be the replacement of a worn valve seat.



**Purox oxygen regulator, Type R-201, is for ordinary welding and light cutting.**

The Monel metal valve stems are not attached to the diaphragms. This construction eliminates the possibility of stem distortion due to diaphragm pull caused by leakage. Accurately machined guides prevent misalignment of the stems and heavy valve closing springs assure positive seating action. The first-stage seats are made of a hard, tough composition material which resists chipping, will hold a perfect seat for long periods, and will withstand full oxygen cylinder pressures. The second-stage seats are made of soft rubber, properly supported. Soft rubber will not withstand full cylinder pressures, but gives faster valve sealing action and is less affected by dust particles than harder materials. The diaphragms are of reinforced rubber, and are fully protected against excessive pressure by large diaphragm plates.

Further information can be obtained from the nearest office of The Linde Air Products Co.

» «

## "Ultraspeed" Spot Welding

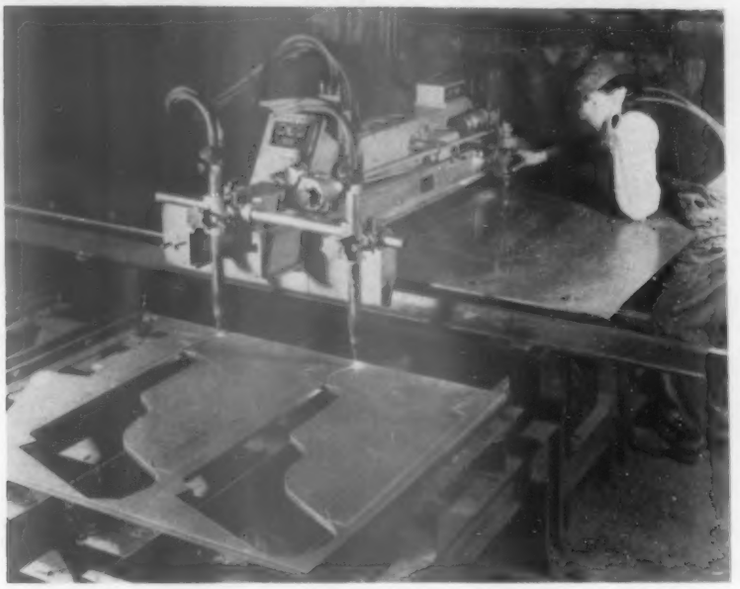
★ A new high production method said to be five times faster than hydromatic welding or any other spot welding method has been developed by Roth Welding Engineering Co., Inc., 17146 Mt. Elliott, Detroit, Mich. In the new Ultraspeed process, a number of spot welding electrodes are operated under pressure simultaneously, each electrode having its own pressure spring and current connection. Welding current is supplied to the separate electrodes at the rate of 10 to 20 "shots" per second. This is accomplished by a special current distributing device of simple design. When all the welds are completed the pressure is released on all electrodes simultaneously.

Among the claims made for the new method are: (1) High speed; (2) Clean welds of greater strength and uniformity than formerly possible in production work; (3) Small transformer capacity; (4) Work is held in position because the electrodes function as hold-down clamps.

From ten to several hundred electrodes may be incorporated in one Ultraspeed spot welding machine. It is stated that the process is particularly applicable in the assembly of sheet metal goods and wire products.

» «

AN ORDER FOR 18 SPILLWAY GATES and one trash gate to be installed in the Chickamauga Dam on the Tennessee River has been awarded to DRAVO CORP., Pittsburgh, Pa. Each of the spillway gates will be composed of separate top and bottom sections, with the top structures measuring 41 ft. wide and 20 ft. high, and weighing about 40 tons. The heavier bottom sections, which will be subjected to the greater pressures, will be of similar width and height, but will weigh about 65 tons each. The trash gate will be composed of three sections. Welded skinplates, a new development in spillway gate construction, will be employed, but all other parts will be riveted.



Automatic machine shape cutting provides easiest and most economical way of producing parts for welded fabrication.

Flame-cut shapes and arc welding are

# Cutting Fabrication Costs

## Sizeable weight savings are frequently realized—Excellent physical properties and greater uniformity of rolled steel are fully utilized

WELDING WIRE PRODUCTION showed an increase of 545 per cent from 1932 to 1937, while production of steel ingots increased only 275 per cent during the same period. It is quite obvious that industry has accepted welded fabrication as welding wire consumption is expanding more rapidly than steel production. The combination of flame cutting and welding has accelerated development of new types of machine construction and the use of rolled steel in place of castings, or in combinations with castings and forgings. These processes naturally have had and will continue to have a far reaching effect on machine design.

Machine construction is planned to resist deformation and maintain its original alignment. With rolled steel it is possible to gain these advantages and others besides. Its properties are more uniform and more readily determined and it can be formed or bent to virtually any desired shape. Weight can be reduced, costs lowered and deliveries expedited. The keeping of machine products up to date and in line with competition means almost constant change in design. Flame cut and welded parts need not be stocked, construction can be changed as rapidly as new drawings are produced.

While the designer may have to study this new method for a while, he will soon uncover many advantages that will more than repay the effort. Welding of the component parts is rapidly accomplished by modern methods and materials. The parts are put together in a homogeneous mass. When properly controlled, the weld compares with the parent metal in tensile strength, ductility, fatigue resistance and machinability. Weld and parent metal become virtually continuous plate.

One of the principal fields for oxy-acetylene cutting, particularly machine flame cutting, is in fabrication. An important branch of fabrication consists of the substitution of assemblies made from flame cut steel plates and shapes or plates and cast steel parts for complete castings. This practice has become one of the outstanding recent developments in machine design and construction. For a great variety of products, fabrication by one or the other of these means has proven a better, faster and cheaper manufacturing method, effecting remarkable savings in labor costs and labor space requirements. A remarkable flexibility and diversity of product is obtained by this form of fabrication from a small stock of quickly replaceable rolled plates and shapes, which incidentally are not subject to obsolescence. Among the principal advantages of fabricated assemblies may be mentioned:*

*Abstracted from "Oxy-Acetylene Cutting," a publication of International Acetylene Assn., 30 East 42nd St., New York City.

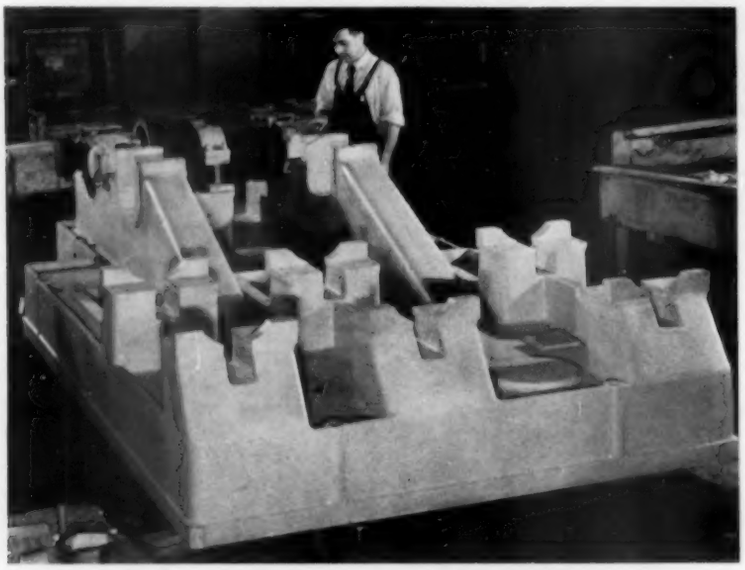


**Fig. 1—Large welded pump base is good example of how changes in section can readily follow most favorable design.**

### Advantages of Welded Steel

1. The excellent physical properties and uniformity of hot-rolled steel are fully utilized.
2. Efficient local distribution of material is obtainable to points where required for resisting working stresses. Changes in thickness or cross-section can follow the most favorable design economics as prescribed by engineering analysis.
3. Fabricated assemblies may be made from two or more dissimilar metals such as mild steel and alloy steel castings welded together to form a single part.
4. Weight is reduced without sacrifice in strength.
5. Machining is reduced, since fabricated parts can be made within close tolerances to finished size.
6. Pattern costs are eliminated. In many cases the delivery time is hastened by the time required to make the pattern. Pattern storage space and charges are largely done away with.
7. Rigidity is obtainable economically and as a result fabricated machines usually serve to prolong the life of dies, cutting tools and other parts and improve the accuracy of workmanship. Properly designed fabricated machines are practically free from breakage.
8. Production losses are eliminated, or reduced to negligible figures.
9. Alterations to fabricated machines are simple and inexpensive.

On the pages which follow we present several examples of flame-cut welded fabrication. These were obtained from the fabricators who helped us assemble photographs and data for this article.

## Taylor-Winfield Corp. Fabricating Division

★ We are indebted to the fabricating division of The Taylor - Winfield Corp., Detroit, Mich., for several photographs of welded assemblies illustrating the many advantages of fabrication by welding. For example, a better local distribution of material can be obtained for resisting working stresses. Changes in section can readily follow the most favorable design based on engineering analysis. This is well illustrated in Fig. 1, a large pump base.

This pump base weighed about 4,500 lbs. and was made up from a good many flame-cut shapes, as well as formed sections. This design was an exact duplicate of a cast-iron frame, with the exception that it was approximately 10% lighter with a considerable increase in strength and rigidity. In this particular case, Taylor-Winfield did all of the machining, including the bearings, etc.

Fabricated assemblies may be made from two or more dissimilar metals, such as rolled steel and mild steel or alloy steel castings welded together to form a rigid part. This is illustrated in Fig. 2, a large press bed, weighing 90,000 lbs. completely fabricated in the Taylor-Winfield shop.

In the process of fabricating this bed, approximately 5,000 lbs. of steel castings were used. In the lower left-hand corner of the picture, the reader can identify a large casting, which is a bearing for a heavy crankshaft, mounted on the side of this bed. There were two large castings of this type, one on each end of the bed. Through the center of the end housing, another large steel casting was used for a bearing. This large press bed is a fine example of the use of flame-cut shapes, without which, it would be impossible to fabricate a bed of this size.

Weight can be reduced without any sacrifice in strength by using flame-cut shapes welded together. Figure 3 is an excellent example. This shows eight diesel engine crankcases completely fabricated from rolled plate and flame-cut shapes. Through the use of welded fabrication it has been possible to reduce the weight of these crankcases between 10 and 15% of that of steel castings and, at the same time, increase the strength and rigidity of the crank-

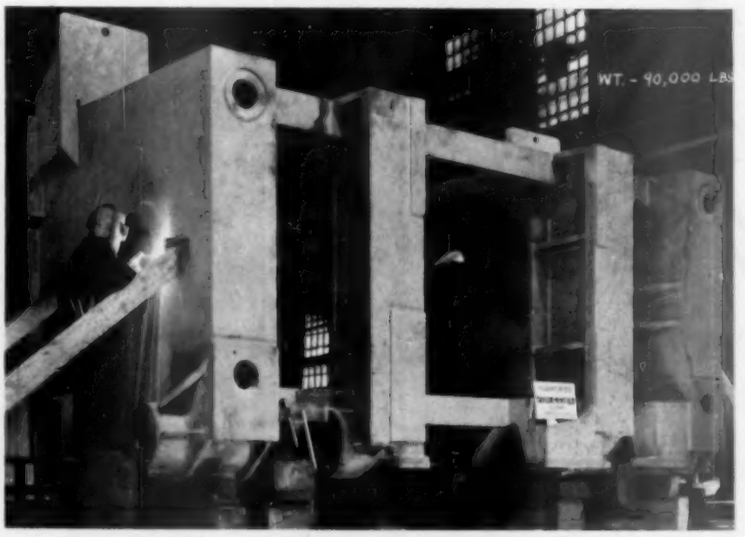



**Fig. 2—Large press bed weighing 90,000 lbs. assembled from rolled steel and castings.**

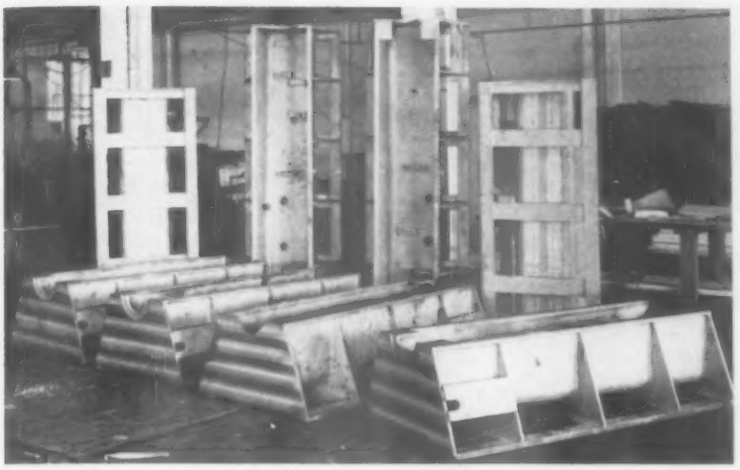


**Fig. 3—Diesel engine crankcases fabricated from rolled plate and flame-cut shapes—A 10 to 15% weight saving is accomplished compared to steel castings.**

cases. These crankcases also are a good illustration of the reduction in machining time and cost, because of the close tolerances it is possible to hold in this type of structure. This is another case where the Taylor-Winfield Corp. did the machining, as well as the fabricating.

The multiplicity of flame-cut shapes which can be obtained is well illustrated in Fig. 4. This shows all of the various flame-cut shapes, which went into the making of the housing shown in the bottom of the photograph. Two completed housings are shown, however, the parts in the picture are for only one housing. This illustrates the flexibility and range of flame-cutting, as the pieces shown range in thickness from ¼ in. to 3½ in., all flame cut.

Figure 5 illustrates the use of two cutting torches simultaneously. The operator is using a plywood and aluminum strip template so constructed that it is possible to cut five separate pieces of different shapes and sizes from a single plate.

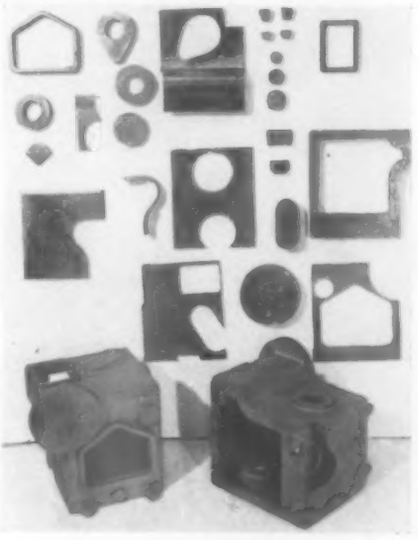


**Fig. 4—Flame-cut shapes which were used in making the housing shown in the foreground—Parts are for just one housing.**

All of the photographs of assemblies made by Taylor-Winfield emphasize the reduction in cost from standpoint of pattern costs and quicker deliveries. Mr. Allen, manager of the fabricating division, in commenting on pattern costs says: "We feel that one of the things overlooked, in stressing the importance of the elimination of the pattern cost, is the fact that there is a storage problem with patterns, which, in a good many cases, is very costly."

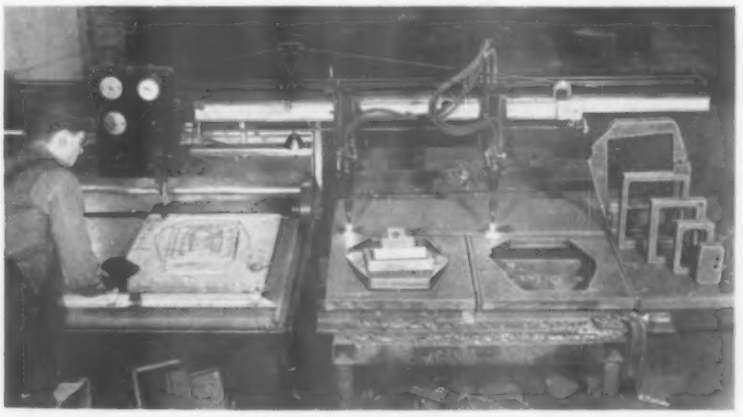


**Fig. 5—Using two cutting torches simultaneously—Operator is utilizing a plywood and aluminum strip template.**

## Welded Cranes Illustrate Advantages of Welding

★ Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., Muskegon, Mich., has given us several photographs of welded structures produced by the Sha-Weld process (flame cutting and arc welding). In Fig. 6 is shown an operator flame-cutting some parts to be used in fabrication of Shaw-Box cranes. The operator is tracing a drawing of the part.

Figure 7 is an exceptionally clear photograph of an all-welded trolley frame. This assembly is part of a 60-ft. span crane of 45-ton capacity, with an auxiliary 20-ton hoist. Shaw-Box was one of the pioneers of all-welded cranes and hoists. An end truck, as used on the trolley frame is shown in Fig. 8. How welding permits the designer to utilize materials economically is well illustrated by this end truck. Journal parts for bearings are flame cut. Notice use of stiffeners where needed to obtain rigidity.

This company was recently called upon to fabricate an unusually large gear to replace a worn drum gear of a 250-ton crane of another make. Some idea of the size of this huge spur gear will be gained from Fig. 9. Mr. Leland of Shaw-Box advises that this ring-type gear is 75-in. in diameter and required over 3000 in. of welding to fabricate it. The job was handled entirely by flame cutting and welding.

In submitting these photographs, Shaw-Box Crane & Hoist Division, emphasize the following three advantages of welded crane design:

(1) Better physical properties and greater uniformity are obtained with hot-rolled steel.

(2) Pattern costs are eliminated. Manufacturing time is cut by not making patterns. Pattern storage space and charges are done away with.

(3) Production delays are eliminated or reduced to negligible amount.

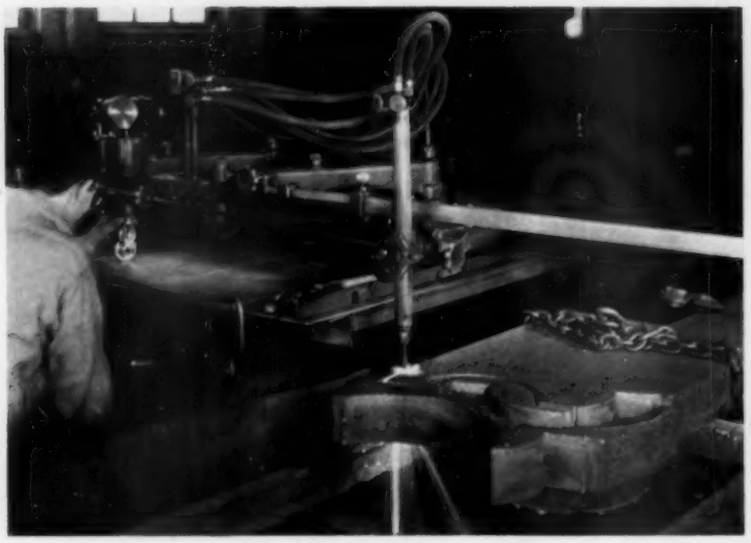


Fig. 6—Shape-cutting some parts to be used in building Shaw-Box welded cranes.

Fig. 7—All-welded trolley frame—Part of a 60-ft. span, 45-ton crane.

Fig. 8—Welded end truck for trolley frame—Journal parts are flame cut—Stiffeners used where needed to secure rigidity.

## Flame-Cut Shapes For Welded Structures

★ Richard W. Sternke, shop superintendent and production manager of Lakeside Bridge and Steel Co., Milwaukee, Wis., in a technical paper* presented at the I. A. A. annual convention outlined briefly the basic advantages of machine flame cutting in fabricating welded structures. What follows has been digested from Mr. Sternke's simple exposition of the process and its technical advantages. Fabrication of modern welded structures involves three major operations:

(1) Flame cutting the principal component parts of a structure, usually from flat-rolled steel plates. Exceptions are structural shapes, forgings or steel castings, or steel plates that have been bent, rolled or otherwise shaped and perhaps welded. In making accurate assemblies, such as machine tool bases and frames, it may be expedient to cut openings after the assembly has been made and welded. In this manner the distortions caused by flame cutting can be controlled or minimized.

(2) Bending or forming the cut shapes when necessary to produce smooth contours and to economize in the cost of welding by cutting down the number of welds required.

(3) Welding the cut and formed parts to complete the final assembly. Exceptions are those on jobs which it is preferable to do certain cutting after forming and welding in order to promote accuracy of dimensions and to avoid waves and buckles detrimental to finish and appearance.

The advantages of flame-cut and welded assemblies may be summarized briefly as follows:

Freedom of Design—There are no apparent limitations in the design of a structure when using a cutting torch. The component parts, after cutting, may then be flanged or pressed to whatever shape may be desired.

Neat Appearance—Contours can be cut to such accuracy that no other medium of finish is necessary when the cutting is done by an experienced operator and with proper equipment.

Rigidity of Structure—The homogeneity of rolled steel and its known uniform value to resist stresses permit economical distribution of materials as required, without increased bulkiness or weight.

*Read at the 38th Annual Convention, International Acetylene Association, Birmingham, Ala.

Fig. 9—Over 3000 lineal inches of welding were required to make this 75-in. ring-type spur gear for 250-ton crane.

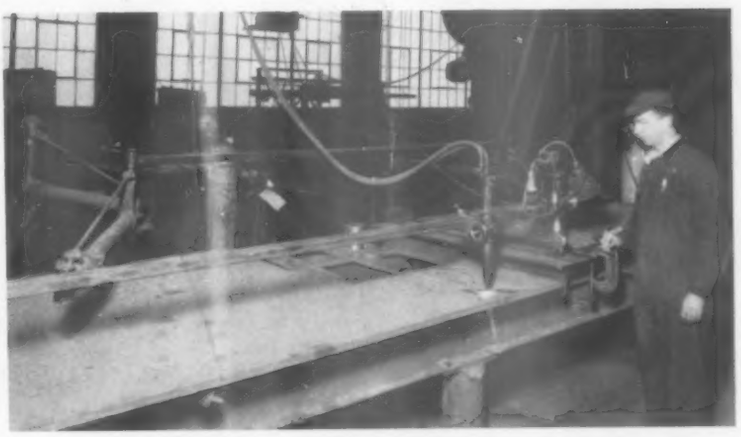


Fig. 10—Making a square cut edge in a plate—Lakeside Bridge and Steel Co. plant.

Fig. 11—Beveling the above edge (Fig. 10) to form a welding vee—Lakeside Bridge and Steel Co. plant.

Fig. 12—Portable flame cutting machine making a circular cut for a baking machine part.

Low Cost of Manufacture—Alterations and difficult changes can be made during or after fabrication without great cost or loss to the manufacturer or customer.

Saving of Weight—By the correct distribution of material, strength can be developed where most needed and weight saved.

The principal subject of this article will be the flame cutting of shapes, the production of flame-cut parts, and how the "tailoring" of sheet or plate steel is accomplished. The process of cutting with the gas torch, when done with one of the modern gas cutting machines, is comparable in smoothness and accuracy to jig sawing patterns from wood. This adaptability in producing shapes, not readily made by the older conventional methods, has been found to be extremely valuable.

### Beveled Joints Necessary

Fabrication of machine tool frames and bases requires that fitting up and welding be done with little or no change in the alignment due to weld contraction. Hence, it is essential that the flame-cut edges be accurately beveled, and that the fitting up or tacking be done with bottom edges butted closely, leaving little or no space between for weld contraction. Obviously, only machine cutting will enable accurate fabrications to be accomplished when no wide gaps in the welding vees can be tolerated. Hence, machine-cut edges are machine-beveled with the torch also.

Locked-up stresses in such welded structures are relieved by normalizing after welding. But when the nature of the job requires accurate fitting up and

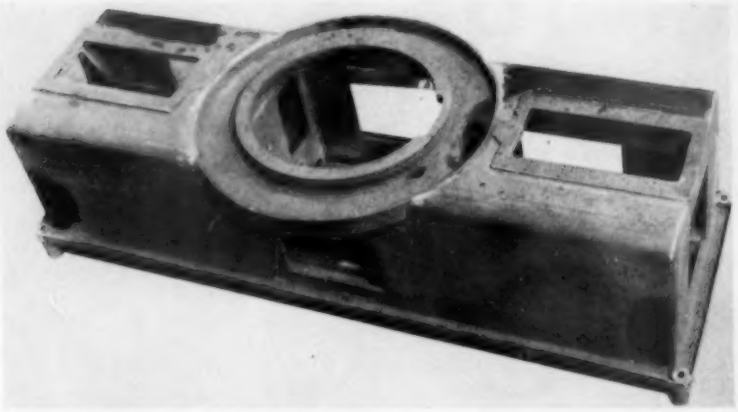


**Fig. 13—Drilling machine base flame cut from ⅝-in. steel plate—Openings were flame cut after assembly.**

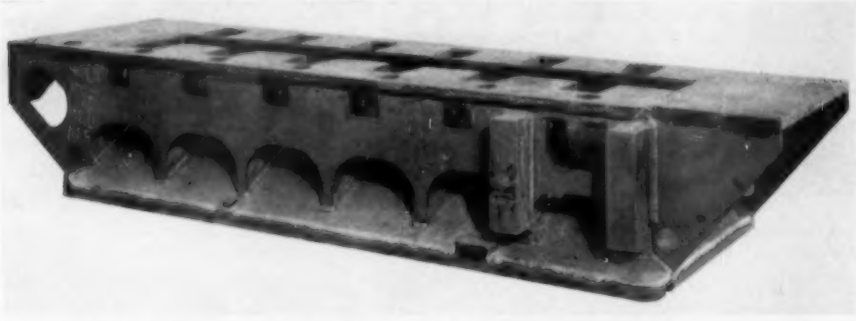


**Fig. 14—Multiple boring machine bed, flame cut and welded—Top is 1½-in. steel; sides are ½-in. steel—All openings flame cut.**

no allowances for weld contraction can be made, and the size precludes normalizing, the welding beads are peened as the welds are made to eliminate as far as possible such locked-up weld stresses.

### Control of Distortion

Flame cutting, whether done by machine or with the hand torch is bound to cause some distortion in the parts cut due to localized application of the high-temperature cutting flame. It is possible to overcome these local distortions when cutting square, rectangular, round and other shaped holes by firmly holding the plates during the cutting process. The simplest and most effective method, where applicable, is to weld into the final assembly, the component sheets which are to contain the holes, and then cut the holes with the gas cutting machine. Locked-up stresses can be relieved in the normalizing process. An incidental advantage of this method of introducing flame-cut holes is that a wrapper plate can be bent or rolled whereas if holes are flame cut in the flat, no bending or rolling can be done afterwards, because of the variable resistance to bending caused by the presence of the holes.

We accomplish machine torch cutting with a stationary machine shown in Figs. 10 and 11. Fig. 10 shows the machine making a square cut edge, and Fig. 11 shows the torch set for beveling the same edge to form a welding vee. Machine cutting is also accomplished with a portable machine designed for making straight and circular cuts. It is shown in Fig. 12 making a circular cut on a baking machine part. Control of the diameter is effected by adjusting the center point on the radius rod to produce the radius or diameter required.

Figure 13 is a drilling machine base, with double head arrangement for indexing table in center flame-cut from ⅝-in. steel. Weight, 3,000 lb. This job is a good example of the advantages of flame cutting in comparison with shearing. Steel plates ⅝-in. thick are beyond the capacity of ordinary shearing machines. Moreover, it would be inadvisable to shear steel plates of this thickness because square edges were required. If sheared the edges would be of irregular shape detrimental to welding. After the outside sheets were bent and the assembly made and welded, integral cutting was then done. The openings at the ends of the frame and in the center and for the circular track were thus cut with the wrapper sheet firmly held against cutting distortion.

Figure 14 is a bed for a multiple-boring machine, flame cut and welded. The material for the top is 1½ in. steel plate and for the sides ½-in. steel plate. Length overall is 12 ft. 6 in. All openings were flame-cut mechanically, due to the several thicknesses and shapes of the steel plates used in the assembly, and to maintain flatness. When the entire base was completely welded, openings which come in contact with the component parts were first relieved by making re-entering cuts on an angle to facilitate welding around the openings. The arch openings, for example, were then cut on the machine, beginning and ending in the welds at each side. This eliminated the necessity for rewelding at these points. Substantially the same procedure was followed in cutting the small square and round openings in the 1½-in. top plate.

(This article will be continued in the October, 1938 issue—Editor.)

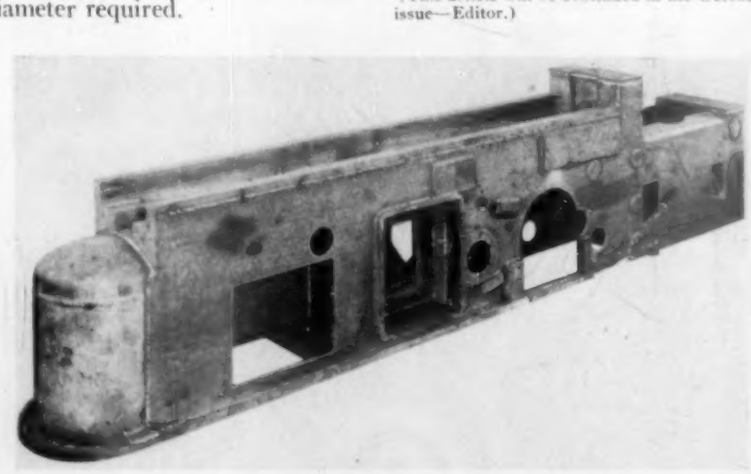


**Fig. 15—Machine tool base flame cut and welded—About 35 ft. of flame cutting used on this base—Weight 4000 lbs.**

Lincoln Foundation

Award Jury announces

# Winners of 382 Cash Awards

## Tremendous savings claimed by authors of prize-winning papers in the $200,000 welding design competition

THE JURY OF AWARD of the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, after judging thousands of papers submitted in the $200,000 Award Program, found that savings to industry by arc welding claimed by the authors of papers aggregated $1,600,000,000.

Altogether, 382 awards were made by the Foundation. The amounts ranged from $101.75 for honorable mention to $13,941.33, for the Grand Award. Recipients included engineers, designers, architects, production managers, superintendents, draftsmen, shop foremen, mechanics, inspectors, welding operators, welding supervisors, owners of businesses, college professors, high school instructors, students, and others. Subjects of studies in the 44 divisions of the program, represented practically every product and structure of industry.

The grand award of the program, $13,941.33, went to MR. AND MRS. A. E. GIBSON, president and stockholder, respectively, of The Wellman Engineering Co., Cleveland, Ohio. The paper, "Commercial Weldery," entered in the Welderies Classification of the program, is said to be an outstanding treatise on all the elements required to assure the business and technical success of all users of welding throughout industry.

An award of $11,397.06 was received by ANANT H. PANDYA and R. J. FOWLER, engineers, Diagrid Structures, Ltd., London, England. Their paper "The All-Welded Grid Applied to Plane and Spatial Structures" may usher in a new era in the design of framing for roofs and floors of buildings. Eliminating trusses and columns except at corners of bays, the design makes a saving of $60,000,000 available to industry, according to the authors.

An award of $8,852.94 was paid to ROBERT E. KINKEAD, consulting engineer, welding, The Carnegie Illinois Steel Corp., Cleveland, Ohio, for his paper, "Industrial Machinery—Steel Making" in which he describes the use of carbon arc welding in a method of producing clad metals, which, if adopted, would save industry $9,845,401 annually.

Award of $7,326.46 went to L. J. CAREY and MARVIN WHITLOCK, foreman and engineer, respectively, American Air Lines, Inc., Chicago, for their paper "Welded Aircraft Piping." The study shows a new stride forward in an industry not so familiar with arc welding as with other forms. Savings in cost as well as increased safety and comfort of air travel are attributed by the authors to their design utilizing arc welding.

The other 378 awards were spread over the 11 classifications of the Award Program.

### Automotive

In the Automotive Classification, a total of $14,957.93 was awarded in the 4 divisions—engines, bodies, frames and trailers. The first award of $3,764.94 went to H. C. WENDT, chief engineer, Hackney Bros. Body Co., Wilson, N. C., for his paper "Welded School Bus Body" which indicates a saving of 50% in cost through arc welding. Second award of $2,543.88 was received by FRED S. BEACH, SR., designing engineer, Northwestern Electric Co., Portland, Ore. Third award, $1,729.84 went to C. A. DAVIS, JR., engineer, Caterpillar Tractor Co., East Peoria, Ill., and fourth, $1,526.33, to NELSON SEVERINGHAUS, superintendent, Consolidated Quarries, Corp., Lithonia, Ga.

### Aircraft

Aircraft awards totaled $13,787.90, there being 10 awards. The largest for a paper in the classification was $7,326.46, awarded to L. J. CAREY and MARVIN WHITLOCK. In addition to receiving first award in the Aircraft class, Messrs. Carey and Whitlock received fourth grand award of the program. An award of $1,322.82 went to RALPH H. UPSON, consulting engineer, Kay Products Co., Detroit, Mich., for his paper "Arc Welding in Aircraft." An award of $1,017.56 was made jointly to JAMES W. FITCH and JOHN CZARNIECKI, engineers, Kenworth Motor Truck Corp., Seattle, Wash., for their paper "Beaching Gears for Aircraft." Seven other awards were made for papers in the classification.

### Railroad

Authors of papers in the Railroad Classification received a total of $13,736.90 for studies of arc welding applied to locomotives, freight cars, passenger cars, or locomotive and car parts, the four divisions of the class.

An award of $2,543.88 went to JOHN H. HRUSKA, metallurgical engineer, Electro-Motive Corp., La Grange, Ill., for his paper "Welded Body of Diesel Locomotives." CLYDE B. FAVERTY, chief engineer, the Ryan Car Co., Chicago, and RALPH H. REDLINE, welding supervisor, American Locomotive Co., Dunkirk, N. Y., received $1,526.33 and $1,322.82, respectively. Fourteen additional awards were made in the classification.

### Watercraft

Awards totaling $12,210.53 were made to authors in the Watercraft Classification. J. T. DALCHER, consulting engineer, New York City, received $2,543.88 for "Modern Type Welded Deck Barge." STANLEY A. MIDNIGHT, structural designer, hull department, American Shipbuilding Co., Cleveland, Ohio, received $1,322.82. An award of $1,017.56 went to ROBERT H. MACY, member hull technical department, Newport News Shipbuilding and Dry Dock Co., Newport News, Va. There were 22 additional awards for papers on welded designs of commercial or pleasure craft.

### Structural

Seventy-one authors received awards totaling $26,049.55 for studies of arc welding applied to subjects covered by the four divisions of the Structural Classification—Buildings, Bridges, Houses, and Miscellaneous Structures. ROBERT V. PROCTOR, general manager and chief engineer, Commercial Shearing and Stamping Co., Youngstown, Ohio, was awarded $2,747.39 for his paper "Arc Welded Tunnel Liner" which shows that $15,198,907 could be saved on proposed tunnels. Messrs. HOWARD E. BOATH and CHARLES MACNISH, Corp. of Engineers, U. S. Army, St. Louis, Mo., received $1,526.33 jointly as co-authors. A joint award of $1,526.33 also went to ROBERT S. TREAT and JOHN F. WILLIS, Connecticut State Highway Department, Hartford, Conn.

### Furniture and Fixtures

Awards in the Furniture and Fixtures Classification covering house and office furniture, totaled $10,684.28. An award of $3,764.94 went to E. J. FREEMAN, associate professor, Clemson College, Clemson, S. S., for "Welded Lecture Room Chair." PAUL J. BIRKMEYER, New York City; CLINTON BOLIN, Lloyd Mfg. Co., Menominee, Mich., and RICHARD E. DROVER, III, Austin Co., Chicago, Ill., received $2,543.88, $1,729.84 and $1,119.31, respectively. Six additional awards were made in the classification.

### Commercial Welding

In the Commercial Welding Classification, the total amount awarded was $11,549.14 in the two divisions—one covering job shops, the other garages. An award of $3,764.94 was made jointly to HOWARD E. MCCORD and FRED H. DREWES, of W. G. Jarrell Mfg. Co., Charlotte, N. C., for their paper, "Organizing and Operating a Commercial Welding Shop." Awards of $2,543.88, $1,526.33 and $1,322.82 went respectively to JAMES M. POOL, Louisville Welding Works, Louisville, Ky.; E. W. WEINBERGER, owner, Weinberger Garage, Mott, N. D.; and GEORGE P. HARBER, owner, Harber Engineering Works, Albany, Ore. Additional awards in the classification totaled 16.

### Containers

The Containers Classification, covering containers, contents stationary (tanks, etc.), and containers, contents moving (pipe lines, etc.), accounted for $12,719.28 of awards. The largest individual amount in the class, an award of $3,764.94, went to ARNOLD A. SEIPEL, hydraulic and mechanical engineer, Bureau of Reclamation, Denver, Colo. His paper, "Welded Scroll Cases for Hydraulic Turbines," showed a saving of $495,753.12 on 18 cases by use of arc welded construction. Awards of $2,543.88 and $1,729.84 went to G. M. STEARNS, district production engineer, Cities Service Oil Co., Russell, Kans., and THOMAS S. GAYLORD, supervisor of welding, Eastman Kodak Co., Rochester, N. Y., respectively. Other awards in the class totaled 27.

### Welderies

Awards in the Welderies Classification, in which the paper for which the author received the grand award of the program was submitted, totaled $22,081.67. In addition to the first award of the class (MR. AND MRS. A. E. GIBSON) $1,526.33 went to PAUL H. SETZLER, production manager, Lukenweld, Inc., Coatesville, Pa., and $1,322.82 to A. H. DAVIDSON, engineer, U. S. Engineers, Providence, R. I.; 21 authors received awards.

### Functional Machinery

The Functional Machinery Classification, open to design studies of arc welding applied to machinery used in several industries, accounted for $28,592.83 of awards spread over the 10 divisions of the class—metal cutting, metal forming, electrical, prime movers, conveying, pumping and compressing, business, machinery not otherwise classified, jigs and fixtures, and machine parts. The principal award, $3,764.94, was received by JOHN MIKULAK, mechanical engineer, Electric Machinery Mfg. Co., Minneapolis, Minn. His paper was "Design for Vertical Synchronous Motor." Awards of $1,526.33 went jointly to co-authors L. M. DAVIS and J. M. MOUSSON of Baltimore, Md., and individually to JOHN N. ANDERSON, designing engineer, Otis Elevator Co., New York, N. Y. Eighty-three additional awards were made in the classification.

### Industry Machinery

The Industry Machinery Classification produced the paper for which the author, ROBERT E. KINKEAD received third grand award of the program, also receiving first award in the class of industry machinery. Second award in the class, $2,747.39, went to J. O. BISHOP, master mechanic and welding supervisor, The National Supply Co., Torrance, Calif. Awards of $1,526.33 went to EDMUND G. GRANT, California Institute of Technology and jointly to co-authors R. F. BERGMANN, Rayon Machinery Corp., Cleveland, and A. F. MACDONALD, American Bridge Co., Pittsburgh, Pa. The Industry Machinery Classification, open to design studies of arc welding applied to machines used exclusively in one of the industries covered by the class, accounted for the largest number of awards (79) and the largest amount ($33,629.99).

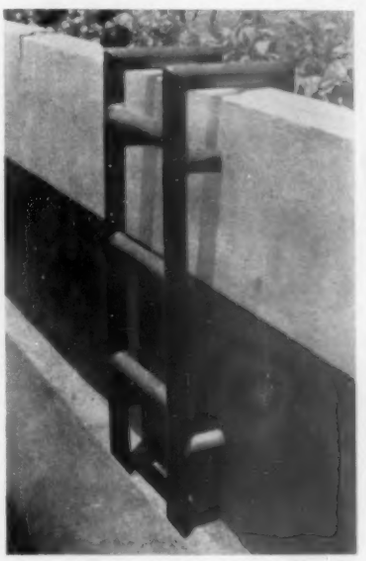
The Foundation's award program, which began 18 months ago, was judged by 31 engineering authorities from leading universities and colleges.

» «

## Welder Improves a Pit Ladder

★ Welded up from pipe, the ordinary pit ladder is amply strong for its job, but is apt to slip toward the concrete when in service, causing hand injuries or knocking the user's feet from the rungs.

The welder for one large crude oil pipeline, following the discussion of the pit ladder's failings in a safety meeting, pulled one of the ladders and vastly improved it by welding four short spacing nipples on the back side of the side pieces. Then, by balancing the length of the hooked top section and the nipples, the ladder is made to grip the concrete wall tightly, while the spacers hold it far enough from the pit side to give ample room for hand-holds, and to permit the ball of the foot to rest on the rungs and obtain secure footing.



**Four spacing nipples were welded to this pit ladder to increase its safety and comfort.**

» «

THE UNION OIL CO. of California has awarded a contract to the Steel Tank & Pipe Co., of Portland, Ore., for the construction of six large welded steel tanks at the company's plant at Edmonds, Wash.

# AN Agile ROD for EVERY JOB

## • Electrodes for Medium Stress

BLUE: For iron, cast steel, tanks, pipes, general sheet work. An easy flowing heavily coated electrode with good penetration. For flat, vertical, and overhead welding. Tensile Strength: 54,000-60,000 lbs. per square inch.

## • Electrodes for High Stress

WHITE: For high tensile carbon and alloy steels, for ship and boiler construction. This electrode has a very high fatigue strength. The weld metal resists corrosion. Excellent for overhead welding. Outstanding for its malleability and corrosion resistance qualifications. Tensile Strength: 68,000-74,000 lbs. per square inch.

## • Electrodes for Highest Stress

BLACK NO. 1: For superior tensile weld. For bridge and steel constructions, machines and parts subject to stresses. The weld metal is ductile, and excellent for forging. It has a greater resistance to corrosion than steel. Tensile Strength: 74,000-83,000 lbs. per square inch.

## • Electrodes for Hard Surfacing

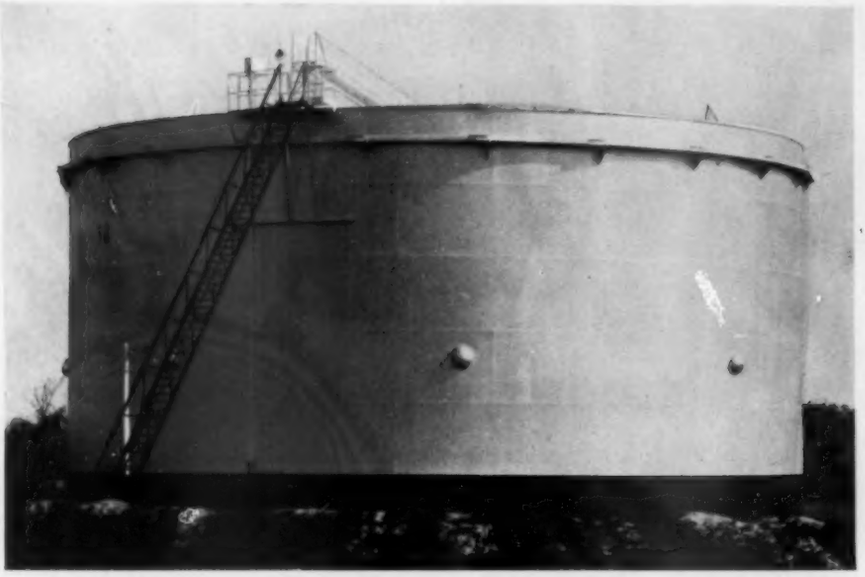
DARK GREEN: For Brinnel hardness of 570-600. For welding castings, especially for hard wear. For repairs to machining tools, cutting edges, punches, and plow shares. This electrode gives a clean, dense weld with an alloy of great hardness. The weld deposit has excellent forging qualities.

**AGILE Electrodes are heavily covered with a special welding flux — which make them superior with A. C. transformers — equally efficient with D. C. generators.**

**This flux permits the electrode to come in contact with the parent metal without sticking. This feature assures a steady arc, low splash loss, low current consumption, faster and neater welds. AGILE 1/16 in. and 3/32 in. sizes lead the field in sheet metal welding.**

## AMERICAN AGILE CORPORATION

5806 Hough Avenue — CLEVELAND, OHIO



**Welded gasoline storage tank—Photo, courtesy of Chicago Bridge & Iron Co..**

» «

ceive special emphasis. Other related technical fields will be given attention, particularly the use of acetylene as the starting point in making chemical products.

» «

IRON AND STEEL INDUSTRY executives participated in the program of the Seventh International Management Congress, which was held in Washington, D. C., from September 19 to 23. Financial and industrial leaders and management authorities from over 40 countries exchanged information on solution of business and industrial problems and dramatized what management is doing and planning in the interests of social and economic progress. Representatives of iron and steel interests who served on the advisory council of the Congress were: EDWARD R. STETTINIUS, JR., chairman, United States Steel Corp.; and ERNEST T. WEIR, chairman of the board, National Steel Corp.

» «

**Arc welding on an oil pipeline project—Photo, courtesy of Westinghouse.**

# News of the Industry

OUR AUGUST COVER—Through an oversight we neglected to identify the illustration on our August, 1938, front cover. This cover showed a welded Hortonspheroid of 10,000-bbl. capacity for storage of natural gasoline under 15-lb. pressure. Photograph, courtesy of Chicago Bridge & Iron Co., Chicago, Ill.

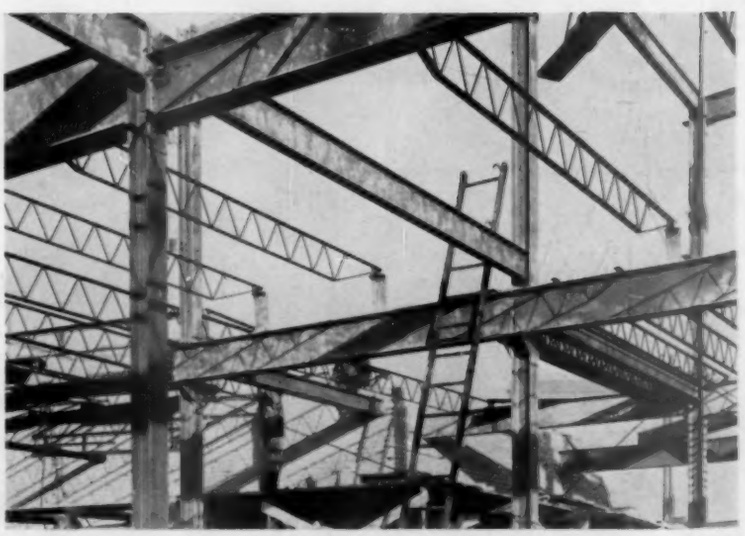
» «

THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION will hold its 16th annual convention on October 11, 12, 13 and 14 at French Lick Springs Hotel, French Lick, Ind. Invitations have been mailed to about 1700 executives of structural steel fabricating shops, and advance interest indicates that attendance will be larger than normal. One of the features of this convention will be an appraisal of the future possibilities of steel construction. The speakers will include DR. WILLARD THORP of Dun & Bradstreet; LOWELL J. CHAWNER, Chief, Division of Economic Research, U. S. Department of Commerce; DR. MILLER MCCLINTOCK, Director, Yale University Bureau for Street Traffic Research; VICTOR J. BROWN, Publishing Director, Gillette Publishing Co. DR. GUS W. DYER, Professor of Economics, Vanderbilt University, will address the banquet to be held on Thursday night, October 13.

» «

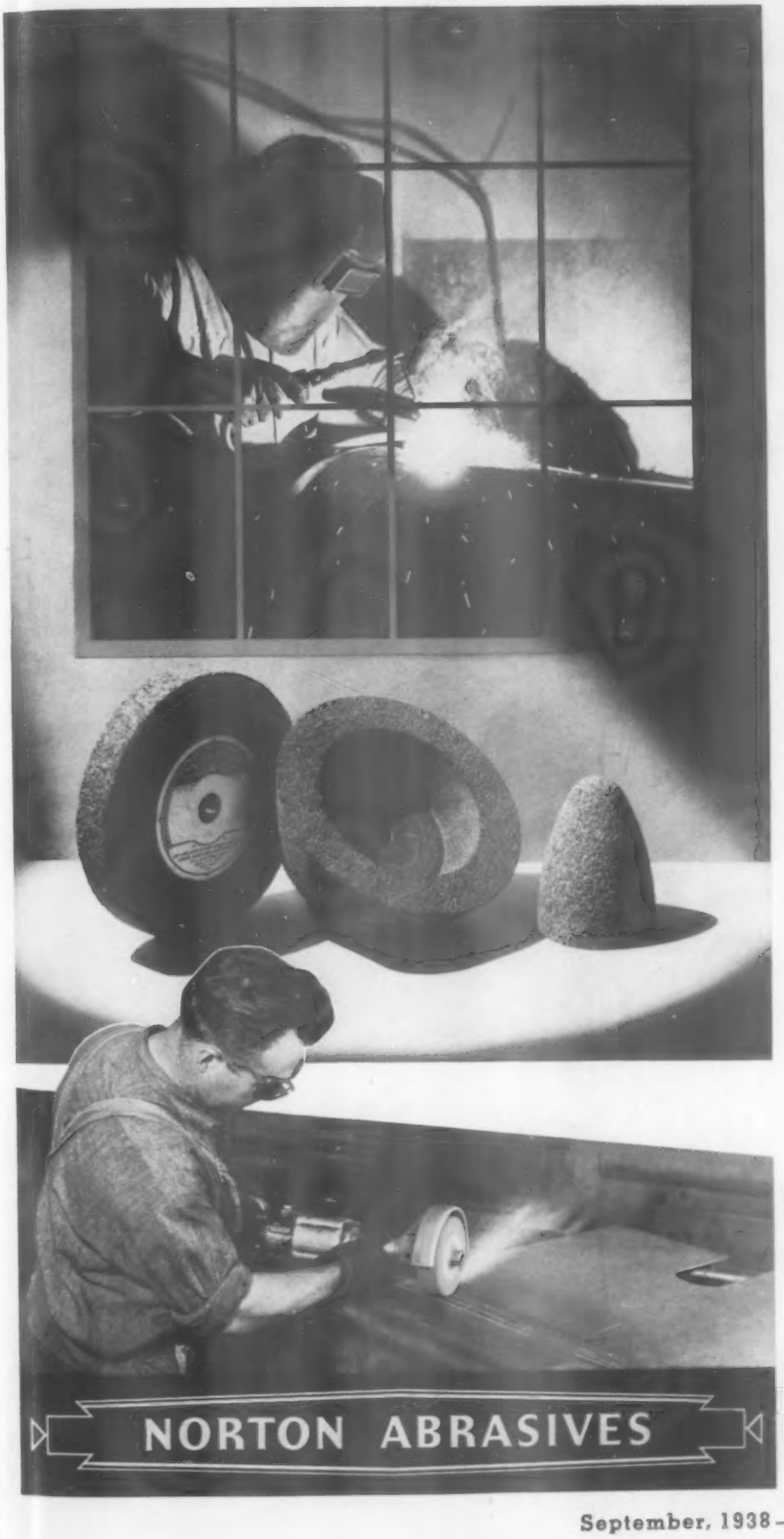
### 13TH INTERNATIONAL ACETYLENE CONGRESS TO BE HELD IN MUNICH

The 13th International Congress of Carbide, Acetylene, Oxy-Acetylene Welding and Allied Industries will be held in Munich, Germany, from June 25 to July 1, 1939. The purpose of the Congress is to promote and discuss all questions of scientific, technical, and economic nature which are related to the preparation and uses of calcium carbide, of acetylene, and of the oxy-acetylene processes. Because of its importance in metal fabrication, oxy-acetylene welding will re-



**At National Cylinder Gas Co. Plant at Ferndale, Mich., steel joists supporting steel roof deck were welded.**

# For Fast Cutting Plus Good Finish . . .




## USE NORTON WHEELS for Weld Grinding

FAST cut and good finish are the two important requirements of wheels for grinding welds — fast cutting to quickly remove the excess metal; a smooth surface for the subsequent finishing operations.

There are Norton Wheels developed especially for the work — straight wheels, cup wheels, cone wheels — vitrified, rubber or resinoid bonded — hard, tough Alundum abrasive.

And if you are polishing after grinding, there is Alundum grain for set-up wheels; also Behr-Manning Metalite Discs for portable sanders.

●

NORTON COMPANY
WORCESTER, MASS.

New York Chicago Detroit
Philadelphia Pittsburgh Hartford
Cleveland Hamilton, Ont.
London Paris Corsico, Italy
Wesseling, Germany

Behr-Manning Division, Troy, N. Y.

W-668

# Personals

FRANK D. NEWBURY has been appointed manager of the New Products Division of the Westinghouse Electric & Mfg. Co. to succeed HERBERT MYGATT WILCOX who died July 28. In addition to this development of activities for Westinghouse in new fields, Mr. Newbury will continue his present duties as economist for the company. Born in Brooklyn, N. Y., and graduated as a mechanical engineer from Cornell University in 1901, Mr. Newbury has occupied a number of positions with Westinghouse.

J. W. MERIAM, vice-president and secretary of the Lincoln Electric Co., Cleveland, Ohio, has retired after 24 years of service. Mr. Meriam's retirement, at the age of 60, closes a business career which spans the growth of the arc welding industry. In 1914 when he joined the Lincoln Electric Co., arc welding was still in the experimental stage. The arc welding generator, in commercially practical form, had just been introduced. Arc welding electrodes were little more than plain wire.

Handling a vast amount of detail transactions, Mr. Meriam has seen the company develop from modest beginnings to a position of prominence in the arc welding industry. During his quarter-century of service, Mr. Meriam has built up a wide acquaintance-

J. W. MERIAM

ship. He has been an active force in both the Cleveland and the National Association of Credit Men. He was president of the Cleveland Association in 1924 and 1925, and a director of the National Association in 1925-26. He has also been active in Y.M.C.A. work.

Although retiring from active service Mr. Meriam will remain a director of the Lincoln Electric Co. The company's credits and collections will be handled by FRANK K. GRIESINGER. A. F. DAVIS, vice-president, was elected secretary.

» «

HENRY W. ROTH, of Roth Welding & Engineering Co., Detroit, Mich., is celebrating the 25th anniversary of his entry into the welding field. Mr. Roth is a graduate of the Munich Institute of Technology, a di-

» «

**Have You Left a Stone Unturned?**

- **Have orders come from the "front office" to cut expenses to the bone?**
- **Yes! You bet they have!**
- **And you probably feel that you have not left a stone unturned in your search for excessive expenditures.**
- **But have you overlooked an opportunity to slash your acetylene costs and still enjoy your present conveniences?**

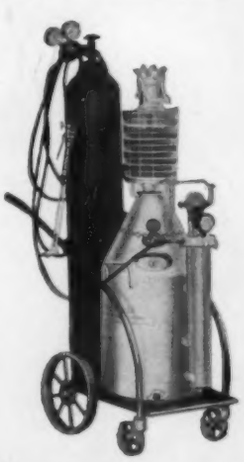
★ ★

- **Do you know that a SIGHT FEED Portable Acetylene Generator—**

*1—Can save you 50% to 75% on your acetylene?*

*2—Is truly portable—not in name only?*

*3—Carries the approval of all 3 leading testing laboratories?*



**The Sight Feed Generator Co.**
**Richmond, Indiana**

Arc welded joint in oil casing.

# See you at the METAL SHOW

DETROIT
OCT. 17-21

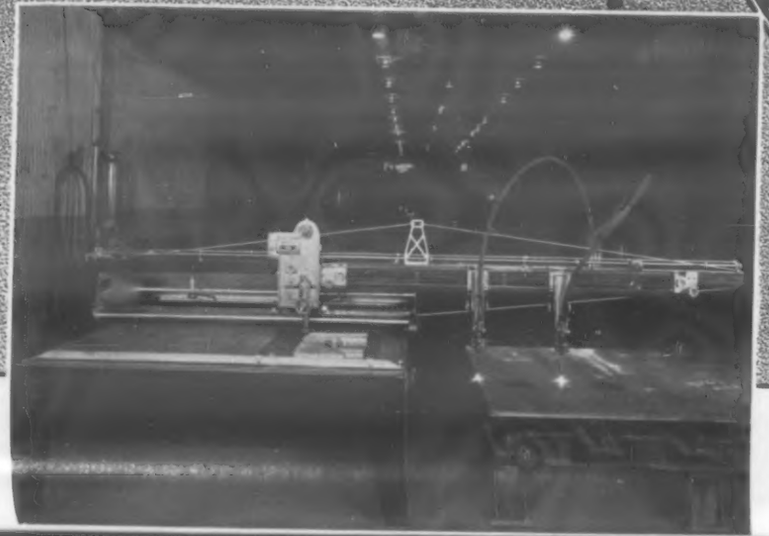
# NATIONAL CYLINDER GAS

**PRODUCTS**

Oxygen • Acetylene
Hydrogen • Carbo-hydrogen
Nitrogen • Carbide
Welding & Cutting Apparatus

APPARATUS OXYGEN NATIONAL ACETYLENE

**GENERAL OFFICES:**
205 W. Wacker Dr., Chicago



*National 646 Oxy-acetylene Shape Cutting Machine. Rectangular cutting range 6 ft. wide by 4½ ft. long. Length can be extended indefinitely.*

**BOOTH C-118**

*National Flame Hardening unit hardening a shaft. Advanced design.*

vision of the University of Munich. He entered the field of resistance welding in 1913, when he designed automatic butt welders and automatic spot welders for several industries. He was director and general manager of two leading manufacturers of welding machines in Germany before coming to the United States.

During his career he has been especially active in research, having developed over 60 patents on resistance welding. He is said to have been in a number of new developments like short-cycle welding (1922); synchronous controls for spot and seam welding (1923); high-frequency welding (1924); hydromatic welding (1933). Since 1936 he has developed a new method which he has named "Ultraspeed Multiple Spot Welding."

## A. W. S. Activities

DETROIT SECTION A. W. S.—D. H. COREY, of The Detroit Edison Co., has been elected chairman of the Detroit Section. Other officers elected for 1938-39 season are H. P. DOUD, of General Electric Co., vice-chairman; and E. ROUSSEAU, of Commerce Pattern & Foundry Works, secretary-treasurer. Executive committees of Detroit Chapter, American Welding Society and American Society for Metals, Detroit Chapter, are holding meetings this month to arrange the details for handling the National Convention.

SAN FRANCISCO SECTION, A. W. S.—Members of the San Francisco Section attended a meeting of the American Society for Testing Materials on September 13. The meeting was arranged by the Northern California District Committee of A.S.T.M., the main speaker of the evening being C. L. WARWICK, secretary of the A.S.T.M., at Philadelphia, Pa., headquarters. Mr. Warwick spoke on the work of the society and recent developments in standardization and specifications. The meeting was held at the Engineers Club, 206 Sansome St., San Francisco, Calif.

» «

KANSAS CITY SECTION A. W. S.—C. E. WOODMAN, who retired as chairman of the Kansas City Section at the last meeting of the 1937-1938 season conceived the idea of making a gavel from a discarded baseball

**C. E. Woodman presents gavel.**

bat which he found in his back yard. With the aid of a woodworking lathe he turned out the attractive gavel which he is shown presenting to C. B. HERRICK, secretary of the Kansas City Section, who received it on behalf of J. A. HALL, the new chairman. We are indebted to Mr. Herrick for the photograph of the presentation.

## Trade News

THE HARNISCHFEGER CORP., Milwaukee, Wis., manufacturers of welders, welding electrodes, excavators, cranes, hoists, electric motors, etc., announce the appointment of L. T. MCGUIRE as Pacific Coast Manager to be located at San Francisco.

» «

THE HARNISCHFEGER CORP., Milwaukee, Wis., manufacturers of P&H-Hansen electric arc welders and Smootharc welding electrodes, announces the appointment of Bronx Hardware and Supply Co. as exclusive agent. This new dealer located at 27-37 Third Ave., Bronx, N. Y., will operate under supervision of the Harnischfeger New York office.

» «

METALLIZING CO. OF AMERICA, INC. has changed its distributor policy and effective September 1 all sales and service will be handled direct by factory branches. New


A SMALL INVESTMENT

Buys MARQUETTE A.C. ARC WELDER

= Big Savings and Profits

*Because* **Marquette A. C. ARC WELDERS cost only $155 to $225 . . .**

*Because* **Arc welding quickly and cheaply repairs expensive metal parts . . .**

*Because* **With a little practice, any one can satisfactorily operate the new Marquette . . .**

**You can make big savings and profits with the Marquette A. C. Arc Welder.**

- **Three models at three prices . . . a size and price to fit your needs . . . $155, $195 and $225.**
- **Oversize transformer for reserve power and steady even arc at all 15 heat stages.**
- **A tap for every heat, a heat stage for every job . . . no dials, no combinations, no confusion.**
- **Ample ventilation through bottom screen and louvered top.**
- **Every model fully equipped . . . nothing extra to buy.**

UL

**Marquette A. C. Arc Welders are listed by Underwriters' Laboratories, Inc.**

MARQUETTE MFG. CO., INC.
MINNEAPOLIS, MINNESOTA

York and Chicago offices have been consolidated into a central office at 562 W. Washington Blvd., Chicago.

Complete stocks of metallizing wire and parts will be carried and a completely equipped metallizing shop will be maintained solely to give instructions to purchasers of Mogul metallizing guns. Welders are invited to visit this instruction department which will be in charge of E. T. PARKINSON, formerly manager of the company's San Francisco office.

Supervising Eastern activities will be L. E. KUNKLER, president, and V. A. COOK, vice-president, who will have their offices at the Chicago address.

» «

HARRIS CALORIFIC CO., 5501 Case Avenue, N. W., Cleveland, Ohio, reports that recently it has received an unusual number of foreign orders for its gas welding and cutting apparatus. These orders covered shipments to England, France, Belgium, Italy, South Africa, Peru, Argentine and Australia.

» «

MINE SAFETY APPLIANCES CO., Pittsburgh, Pa., announces official approval by the U. S. Bureau of Mines of the M.S.A. air line respirator (approval No. 1909) and the M.S.A. abrasive mask (approval No. 1907). With the approval of these devices, respiratory protective equipment bearing this approval is available for use in many common industrial operations and processes which expose the worker to harmful dusts and fumes.

» «

DURA-BILT WELDER CO. has been formed to manufacture welding guns and transformers for the industrial trade. The new company is headed by VICTOR HALL, with headquarters at 3708 Meldrum Ave., Detroit, Mich.

» «

R. G. HASKINS CO., manufacturers of flexible-shaft machinery for portable grinding applications, has moved to a new plant at 615 S. California Ave., Chicago. The company was formerly located at 4636 West Fulton St.

» «

STEEL SALES CORP. has opened a new warehouse in St. Louis, Mo., for the benefit of its customers in St. Louis and vicinity. Complete stocks of welding rods, supplies, silver solders, etc., will be carried in this warehouse located at 4565 McRee Ave., St. Louis, Mo.

» «

THE WELTRONIC CORP., 725 Piquette Ave., Detroit, Mich., has been formed by FRED H. JOHNSON, WILLIAM M. MARTIN and CLETUS COLLUM, to manufacture timers for welding equipment. Mr. Johnson is head of Progressive Welder Co. Mr. Martin is head of Martin Transformer Co. Cletus Collum has been associated with the welding department of Chrysler Corp. for the past 13 years.

» «

Roy W. SMITH, who operates Hobart Welder Sales and Service, 5257 Trumbull Ave., Detroit, Mich., has been appointed a distributor for Una Welding Inc., Cleveland, Ohio.

## Construction

LOCKHEED AIRCRAFT CORP. will soon have a new welded steel building at Victory Place and Empire Ave., Burbank, Calif. The Consolidated Steel Corp., of Los Angeles, was awarded the contract.

» «

CONSTRUCTION OF AN 800-TON daily capacity flotation mill for the Caselton mine of the Combined Metals Reduction Co., Pioche, Nev., is being planned. Much of the equipment for this plant will be of welded fabrication.

THE WINKLER-KOCH ENGINEERING CO., of Wichita, Kans., was recently awarded a contract for the construction of an oil refining plant at Hillyard, Wash., for the Empire Refineries, Inc., Completion of this project, which will employ much welding, is scheduled for November.

» «

THE BOYLE MFG. CO., of Los Angeles, Calif., welded metal fabricators, plan the early addition of a new factory building on Santa Fe Ave. for the manufacture of their line of garden tools. Welding will be employed extensively in the erection of the building and in the manufacture of the company's new products.


Okocord EXTRA FLEXIBLE WELDING CABLE

YOU WILL GET REAL SERVICE from welding cable that has extreme flexibility, resistance to severe abuse, and insulation that can be relied on for the life of the cable.

Okocord Welding Cable has all three characteristics and, in addition, resists moisture and the destructive action of chemicals. It will give you long, trouble-free service, and do it economically.

1938 Marks Our 60th Year of Service

THE OKONITE COMPANY

Founded 1878

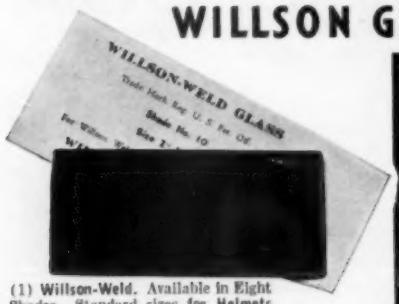
EXECUTIVE OFFICE: PASSAIC, NEW JERSEY

HAZARD INSULATED WIRE WORKS DIVISION — THE OKONITE-CALLENDER CABLE CO., INC.

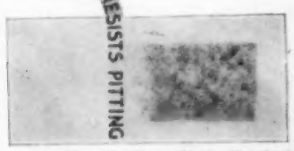
New York Boston Seattle Buffalo Chicago Dallas Detroit Atlanta
Philadelphia Los Angeles Pittsburgh St. Louis Washington San Francisco

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

# WELDERS' EYE PROTECTION . . .
## *Assured* WITH WILLSON-WELD *and* WILLSON GLAZE-ITE COVER GLASS




(1) **Willson-Weld.** Available in Eight Shades. Standard sizes for **Helmets** and **Handshields:** 2" by 4¼". Also rectangular and square pieces up to 5" by 5". **For Goggles:** Sizes to fit all Willson Goggles.




*Trade Mark Reg. U.S. Pat. Off.*

(2) **Glaze-ite Cover Glass.** Standard 2" by 4¼" pieces for Helmets and Handshields. Lenses for all Welding Goggles.

**WILLSON-WELD**

You can be sure of maximum eye protection when using *Willson-Weld;* its chemically correct composition eliminates injurious Infra-red and Ultra-violet rays. Developed after years of scientific research in the Willson Optical Laboratories, it is accurately graded for density of shade and thickness, and conforms to the rigid requirements of the *Federal Specifications.* To obtain the correct shade, specify the desired use when ordering. Where impact hazard is a factor, inquire about *Super-Tough Willson-Weld.*

**WILLSON GLAZE-ITE COVER GLASS**

A Cover Glass which can be depended upon to outlast any ordinary glass, *Glaze-ite* has been specially treated to resist excessive pitting during arc and acetylene welding operations. Note the helmet cover glass in the illustration. It was in use for hours. The clear half had been treated with *Glaze-ite.* The pitted half was left plain.

Consult your authorized Willson Distributor or write

DOUBLE WILLSON PRODUCTS INCORPORATED READING, PA., U.S.A.

GOGGLES RESPIRATORS HELMETS


E. W. Allen, vice-president of General Electric Co., Schenectady, N. Y., donned a welder's helmet to weld a strong-box containing historical records and a sound film of the ceremonies into the cornerstone of the new $800,000 addition to Ellis Hospital, in Schenectady. Customary building noises were eliminated by the use of electric welding in the erection of the framework.

**E. W. Allen at dedication ceremony.**

» «

M. P. McCaffrey, of Los Angeles, Calif., welding contractor and builder of welded highway construction equipment, has awarded a contract for a welded steel building at his new location, 2121 East 25th St. The new structure will be 90 ft. x 200 ft., and will cost about $12,500.

» «

### All-Welded Tankers For Atlantic Refining Co.

A contract for construction of a third 18,500 ton all-welded, turbo-electrically driven tanker for The Atlantic Refining Co. has been let to the Sun Shipbuilding and Drydock Co., Chester, Pa. The vessel is to be a sister ship to the "Robert H. Colley," which was launched from the Sun Shipyards at Chester on Saturday, July 9. Construction of the new vessel at an estimated cost of $2,500,000 is another step in Atlantic's $28,000,000 expansion and development program for 1938, as announced last May. The new vessel, scheduled for delivery in January, 1940, will give the Atlantic fleet the three largest turbo-electric welded ships in the world.

The Dravo Corp., Pittsburgh, Pa., has begun operations on an order for three semi-welded hopper type barges placed by the Marquette Cement Mfg. Co. The barges will be used for hauling bulk cargo, principally coal, over a 95 mile stretch on the Illinois River to the cement company's La Salle plant.

The barges will have hull dimensions of 195 ft. by 35 ft. by 11 ft., and will be of conventional river design, hopper type, except for the distinction of a raised coaming at the main deck level. The framing will be riveted, but all deck, side, and bottom plating is to be welded with the exception of side and hopper plating in the way of the side and hopper frames, where rivets will be used.

## *Current Reviews*

### Trade Standards—Compressed Air Industry

This is a handsome 112-page book, 8½ x 11, with wire binding and an artistic cover design. It is more than double the size of the previous edition and includes such new material as sections on rotary compressors and vacuum pumps, centrifugal compressors and blowers, compressor accessories, rock drills and pneumatic tools; additional charts, tables and data; also an up-to-date revision of material previously published on reciprocating compressors and vacuum pumps (stationary type), portable compressors, and a description of the method of testing displacement compressors, blowers and vacuum pumps conforming to the revised A.S.M.E. Code now under preparation.

The book will be sent for $1.00 plus postage by writing to C. H. Rohrbach, secretary of the Compressed Air Institute, 90 West St., New York City.


# The Improved "Round File" Gas Lighter

**Locking "Slip-on" Renewal**

***—an exclusive feature***

**The patented cartridge holding the spark metal locks exactly in correct position, permitting instant replacement.**

**Get acquainted with the many other superior, exclusive features of Improved "Round File."** ***Circulars and prices on request.***

**SAFETY GAS LIGHTER CO.** (Est. 1901) **LYNN, MASS.**

# Recent Patents

RAIL WELDING

2,124,849. JAMES A. DRAIN, JR., Brooklyn, N. Y., assigned to Sperry Products, Inc., Brooklyn, N. Y. Filed Sept. 30, 1936. Issued July 26, 1938. This invention relates to the type of welding known as flash butt welding, and is an apparatus designed for use particularly in connection with the welding of rails. In the flash butt welding process an arc is struck between the surfaces to be joined so that the surfaces are heated to plasticity, and then the two members are brought together with considerable force, end to end, to form the weld. During this operation some of the metal is squeezed out to form a bead surrounding the weld and the removal of this bead has, heretofore, consumed considerable time. The bead is usually removed by chiseling off most of the surplus metal while the metal is still hot and then grinding off the remainder after the metal has cooled. The patentee provides a die having a cutting edge which conforms to the contour of the ends of the rails being welded, and operates the die across the weld after the welding has been completed to remove the bead.

» «

RAIL WELDING PROCESS

2,124,850. HARCOURT C. DRAKE, Hempstead, N. Y., assigned to Sperry Products, Inc., Brooklyn, N. Y. Filed Sept. 30, 1936. Issued July 26, 1938. A process is provided for welding rails and similar members whereby weakened portions are avoided. In the welding of rails end to end there is the difficulty which arises by reason of the fact that the head of the rail and the base of the rail extend outwardly from the central web. If the welding is started at the base of the rail and metal is added within the weld area so as to fill up the space between the bases, and within the space between the webs, it is necessary to stop the welding process when the head is reached in order that plates may be positioned on the under side of the projecting head, before the welding process can be continued and metal added in the space between the heads. The stopping of the welding process for the purpose of positioning the plates beneath the head results in a point of weakness in the weld.

» «

HYDRAULICALLY-OPERATED WELDER

2,126,903. WILLIAM H. MARTIN, Detroit, Mich. Filed Dec. 3, 1936. Issued Aug. 16, 1938. A hydraulically-operated welder having a power means for circulating a cooling liquid through parts of the welder in which the welding current is induced by the primary of a transformer mounted on the welder. The apparatus also provides means for operating a pressure device that transmits power hydraulically to produce the required welding pressure on the work and yet produce such movement of the welding points to the work as to prevent "mushrooming" of the points. A light weight transformer transforms relatively high potential, high-frequency current into a welding current of low potential and large amperage in a secondary located in close current conductive relation to the welding terminals. This eliminates large current conductive cables, large heat losses, and large potential drops.

» «

HEAT APPLYING APPARATUS

2,125,916. JOHN M. HALBING, Bloomfield, N. J., assigned to Union Carbide and Carbon Corp., N. Y. Filed June 9, 1934. Issued August 9, 1938. An apparatus is described for applying high-temperature heat to metallic objects during welding operations. The apparatus comprises a nozzle having an outlet for a welding jet situated in a bore. The bore has a side outlet for delivering a preheating jet, the side outlet being of smaller cross-sectional area than the end or jet outlet. The preheating jet is so situated that when the welding jet is oblique to the work, the preheating jet is substantially vertical to the work. The preheating jet precedes the welding jet and is supported by a rocker shaped rod which moves along the work.

» «

FABRICATING STORAGE TANKS

2,126,997. ANDREW A. KRAMER, Kansas City, Mo. Filed Mar. 19, 1937. Issued Aug. 16, 1938. A method of making a tank of sheet metal sections in which the bottom, side wall, and top sections are first fastened


✓ In order to better demonstrate the advantages and improvements of Weldit equipment, an operating exhibit of

**Gas Saving Welding Torches**

**Gasavers**

**Automatic Shape Cutting**

**Spot and Arc Welding**

will be shown at our plant, 638 Bagley Ave. (two blocks west of the Detroit Leland Hotel), during the Metal Show, October 17-21.

*"You Are Invited"*

WELDIT ACETYLENE COMPANY
DETROIT - - - - - - - MICHIGAN

# Ryerson a dependable source for Welding Rod

● Ryerson Engineers have developed a series of rods that are outstanding for Quality production. More than twenty types, including both electric and gas rods, are carried in stock. Whether you need a shielded arc type for production work or a stainless steel rod you can be sure of immediate shipment... *Write for Bulletin which gives complete data.*

**Ryerson**
Shielded Arc Type
No. 215
Shielded Arc Type
No. 216
Shielded Arc Type
No. 217
Green Processed No. 18
Copper Coated No. 206
Copper Coated No. 210
Cast Iron

**ELECTRODES**

**Ryerson**
Green Processed No. 6
Bare Mild Steel
Brown Processed
White Flux Coated
High Carbon White Flux Coated
Blue Flux Coated

**GAS RODS**
3½% Nickel Steel
High Carbon Bare
No. 2110

**Ryerson**
3½% Nickel Steel Flux Coated
High Manganese Steel
Hard Surfacing
Allegheny Stainless Flux Coated
Allegheny Stainless No. 44

Tobin Bronze
Allegheny Stainless Bare
Hard Filler

JOSEPH T. RYERSON & SON, Inc., Chicago, Milwaukee, St. Louis, Detroit, Cleveland, Cincinnati, Buffalo, Boston, Philadelphia, Jersey City


together by suitable securing elements, such as bolts, after which all of the joints are welded in place. In the preferred construction, side walls of the tank are provided with flange sheets and the flanges are bolted together prior to the welding. This construction avoids hinging of the sheets. It also avoids tack-welding of the bottom of the tank from underneath.

» «

BUTT WELDING PROCESS

2,127,685. GERALD G. GREULICK, Mount Lebanon, Pa. Filed July 30, 1936. Issued Aug. 23, 1938. This invention deals with the butt welding of edges of metals having dissimilar thicknesses to produce a homogeneous weld. A method is employed in which at least one of the edges of the metal having the least thickness is provided with a diamond-shaped enlargement whose greatest thickness is substantially equal to the thickness of the other metal to which it is to be welded. The surface of the thicker piece of metal is so shaped that a line contact is produced between the metals. Such procedure ensures a uniform heat absorption by both pieces of metal during the welding of the metal pieces at the line of contact.

## Trade Literature

THE EISLER ENGINEERING CO., 756 South 13th St., Newark, N. J., has issued a new catalog No. 38-T, (8½ x 11) 24 pages, with about 100 illustrations showing "Transformers in the Making." A complete line of distribution transformers, spot welding transformers and many types of special and standard transformers used in various industries are shown.

In the same catalog will be found a complete line of special welding machines from 1 kva. to 400 kva., with air and water-cooled transformers; foot, air and motor operated.

» «

INDUSTRIAL LIGHTING—"The Meaning of the RLM Label," a factual exposition of the principles of modern industrial light conditioning. Provides purchaser of lighting equipment with the basic factors in industrial lighting and the basic standards of efficiency, design and quality of the various types of lighting reflectors bearing the RLM label. A buyer's guide. Free on request. Address the RLM Standards Institute, Room 1130, Civic Opera Building, Chicago, Ill.

» «

PRATT & WHITNEY, Hartford, Conn., has issued Catalog No. 15 covering its line of small tools. Products covered include threading taps and dies, screw plates, milling cutters, reamers, punches and drills. A valuable reference section is included with numerous tables containing practical data on thread standards, decimal equivalents, etc. This 450-page catalog is cloth bound and carries a handy index at the back.

» «

GRAY IRON SPECIFICATIONS—A guide to engineering specifications for gray cast-iron has been published by International Nickel Co., 67 Wall St., New York City. It is stated that the compositions described in the bulletin have helped to elevate cast-iron to a prominent position among engineering materials. Higher strength, improved machinability, better resistance to wear, as well as other valuable properties are available today at a nominal premium. Because of their better performance and longer useful life, the slight premium which they bear may be translated into an attractive ultimate economy.

» «

WELDING ALUMINUM—Aluminum Company of America, Pittsburgh, Pa., has published a 48-page pocket-size booklet covering the gas welding and electric welding of aluminum and its alloys. Space is devoted to welding of heat-treated aluminum alloys and of aluminum castings. Both arc welding and resistance welding methods are described in complete detail with the aid of many illustrations and drawings. The booklet is handsomely printed and bound with a lacquered cover.


REGISTERED U.S. MANGANAL PATENT OFFICE

# SAVE... by welding

**Jaw Plates, Gyratory and Roll Crushers, Shovel Teeth, Hammers, Tractor Tread Grousers, etc., with**

***Manganal 11 to 13% Nickel Manganese Steel***

U. S. Patents 1,876,738 1,947,167 and 2,021,945

**WELDING ELECTRODES**
**WEDGE and APPLICATOR BARS**
**Hot Rolled PLATES**

***Descriptive circular on request***

**STULZ-SICKLES CO.** Sole Producers **91 N. J. Railroad Avenue, NEWARK, N. J.**

***If you haven't received your copy of "A.B.C.'s of Manganese Steel Welding" write for free booklet***

WELDED ERECTION SEATS—Van Rensselaer P. Saxe, consulting civil engineer, 100 W. Monument St., Baltimore, Md., has prepared a bulletin describing the application of a patented welded erection seat. It is stated that this type of erection seat has been used in over 50 large welded steel frame structures. The bulletin points out certain economies: "The welded erection seat and its connecting clip angle are shop welded, which saves in job-time. Mill buildings may be field welded as fast as steel is erected. Multiple-story buildings are field welded one tier of columns below those being erected. The erection seat allows a construction speed equal to riveted work, and with the versatility of welding makes up to a 15 per cent saving in fabrication and cost of steel used."

# Classified Section

**ADVERTISING RATES**

**Help Wanted — 75c per line, minimum 4 lines. Jobs Wanted — 4 lines free. Other Ads — $1.00 per line, minimum 4 lines. Count 8 words to line. Add 6 words for keyed address.**

## FOR SALE

FOR SALE—6000 ft. slightly damaged, practically new rubber-covered super-flexible welding cable, No. 2 size, for 200-amp. welders, only 12 cents per ft.; also Lincoln 150-amp. vertical welder, $125; Metallizer gun, $125. Address Sep-9, The Welding Engineer.

FOR SALE—200-amp. Burke arc welder. Mounted on Chrysler chassis, driven by Chrysler motor. Tires in good usable condition. Commutator is from 80 to 90% full. Heavy duty 40-volt generator. Complete less cable holder and shield, $250. Chas. Brinkman, Box 181, Aplington, Iowa.

BARGAINS—Demonstrator Arc Welders. Gasoline and electric drive. 30 days' trial. Easy terms if desired. Write Hobart Welder Exchange, Box U-981, Troy, Ohio.

FLY BALL GOVERNORS—Adapted to all makes of auto engines; belt driven, flat or V. Price $6.50 prepaid; Ball bearing $2.00 additional. Satisfaction guaranteed. In ordering state style of belt. Wm. Alber, Beatrice, Nebr.

FOR RENT—300 amp. Dualarc gas-engine driven arc welder—by day, week or month. Address Sep-6, The Welding Engineer.

## WANTED TO BUY

WANTED—Fifty used electrolytic hydrogen cells, 800 amperes, I.O.C. Type 1000-C preferred, but will consider other makes. State price, full particulars and where cells may be inspected. Address Sep-7, The Welding Engineer.

## HELP WANTED

HELP WANTED—Civil engineering graduate about 25 yrs. of age with a year or two of general construction experience, including welding training or experience. Applicant must be single. Location India permanently. Give full details. Address Sep-8, The Welding Engineer.

## POSITION WANTED

WELDING ENGINEER, instructor, estimator, fabricator, erector (shop or field) redesign, production, gen. mtce. and repairs, sales with over 25 yrs. exceptional exp. every branch, open for permanent responsible position with future assured. Will go anywhere, foreign considered. Willing to prove self. Address Sep-1, The Welding Engineer.

WELDING SPECIALIST—Capable of handling men in shop or sales work. Capable of teaching elec. welding. A welding specialist for leading mfr. of weld. equipment last 5 yrs. Prior to that, 10 yrs. as service engr. on elec. power equipment. Can give good ref. Age 37, married. Address Sep-3, The Welding Engineer .

WELDER—Trade school graduate wants work as welder or welder's helper. Willing to go anywhere. Harry C. Hervey, Lucas, Iowa.

COMBINATION WELDER—Age 26, single. 2 yrs. exp. in own job shop. Can handle men. Free to travel. Good references. Larry Wade, 117 N. First St., Miamisburg, Ohio.

LAYOUT MAN AND ELECTRIC WELDER—Layout from undetailed drawings. Make developments. 9 yrs. all-around welding exp. Can pass any test. 31 yrs. old. Address Sep-2, The Welding Engineer.

ARC WELDING AND GAS CUTTING—Willing to work for 40c per hour. Raymond Rynes, Gregory St., Briar Hill, Madison, Wis.

MANAGER OF WELDING DEPT.—Can direct the welding of all metals, either by oxy-acetylene or electric. Willing to go anywhere, but prefer Colo., New Mex., or Arizona. Operated own shop for 17 yrs. Age 39. Geo. A. Work, Ord Welding Shop, Ord, Nebr.

COMBINATION WELDER—7 yrs. exp. light and heavy work. Age 28. High school graduate. Willing to go anywhere. Harold Mattonen, 1007 Quincy St., Hancock, Mich.

DEMONSTRATOR-SALESMAN—Capable arc welder with college training, desires location as demonstrator-salesmen of welding equipment. Address Sep-4, The Welding Engineer

ARC WELDER—Graduate of Greer College, would like position as helper to gain more experience. Prefer Ohio. Clarence H. Nagel, 139 N. Frankfort St., Minster, Ohio.

WELDER—Auto and diesel practical training. Graduate of Greer College. Free to go anywhere in Canada. Can weld either electric or acetylene. Hector N. Coutu, Box 241, Selkirk, Manitoba, Can.

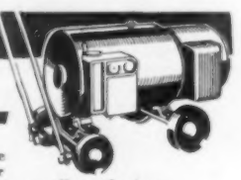
COMBINATION WELDER—8 yrs. exp. in gas and electric arc welding. Desires job with future. Prefers California or Oregon. Factory approved Chevrolet mechanic. Edwin R. Stang, P. O. Box 74, Richvale, Calif.

ELECTRIC WELDER, MAINTENANCE MAN—5 yrs. exp. References if required. Carl H. Definbaugh, Route 2, Barnesville, Ohio.

COMBINATION WELDER, MACHINIST, BLACKSMITH—Age 38. Good references. Read blueprints, layout sheet or pipe, hard-facing. C. L. Small, La Crosse, Kans.

SALES AND DEMONSTRATION—18 yrs. exp. in diversified welding, supervising, demonstrating and selling welding equipment. Well acquainted with users of electrodes and welding equipment in N. Y., N. J. area. Can furnish best of references. Address Sep-5, The Welding Engineer.


GUARANTEED Rebuilt Welders



Welder Specialists. We rebuild and guarantee welders like new. Save 30 to 70%. Get our prices on Standard Makes before you buy. We buy, sell, exchange.

THE MOTOR REPAIR & MFG. CO.

1545 Hamilton Ave. Cleveland, Ohio

# New Technical Literature

**We have listed on these two pages brief reviews of new technical literature prepared by experts in the employ of welding equipment manufacturers. Any literature you may desire will be sent to you free of charge. Merely check or mark the serial number of the paragraph on the order blank at the bottom of the next page. No obligation.**

**Preventing Welding Fires**

(1) A publication of the I.A.A. which presents very concisely information on how welding and cutting fires may start, also giving important and common sense rules for preventing such fires. 16 pages.

**Copper and Copper Alloys**

(2) Reprint of a technical paper by Maurice G. Steele, of Revere Copper and Brass, Inc., which summarizes important properties and typical industrial applications of 30 types of coppers and copper-base alloys. 4 pages and chart.

**Eye Shields for Welders**

(3) A small folder issued by Jackson Electrode Holder Co. describes four types of wide-vision eye shields for oxy-acetylene welders, spot welders and general eye protection in industrial plants. Pocket size.

**Plastic Iron**

(4) Northeast Metals Co. has literature describing application of its Plastic Iron. It is stated that arc welds on cast-iron can be made pressure tight quickly and permanently with Plastic Iron. 2 pages.

**Rotary Files**

(5) Grobet File Corp. of America has a new catalog, R-40, describing its line of rotary, hand cut, rasp cut and milled cut files, a total of more than 200 different kinds.

**Miller-Strobel Arc Saw**

(6) Miller Electric Mfg. Co. has issued a four-page bulletin describing the Miller-Strobel arc saw for cutting cast-iron, steel, alloys, ferrous and non-ferrous, including tungsten carbide. Cutting is accomplished by means of a controlled arc that "leaps ahead of the saw and brings the metal along the kerf line to a molten or plastic condition."

**Welder's Trouble Shooter**

(7) Westinghouse Electric & Mfg. Co. has issued booklet 2150-A, pocket size, detailing some of the common troubles encountered by arc welders. In each instance, the principal cause is listed and the recommended cure. A few of the troubles covered: brittle joints, corrosion, distortion, incomplete penetration, magnetic blow, porous welds, etc.

**Welding Electrode Catalog**

(8) The Champion Rivet Co. has issued a new catalog covering its line of welding electrodes. Technical data is included on operation of the welding arc.

**The Flexarc Dial**

(9) This publication of Westinghouse Electric & Mfg. Co. presents in newspaper style the advantages of arc welding, both in repair and fabrication. Typical examples of good welding practice are illustrated graphically in a series of simple sketches.

**Oxweld Welding Rod**

(10) Brief descriptions in non-technical terms of the various Oxweld welding rods and their welding characteristics, including steel, bronze, cast-iron and aluminum. Gives comprehensive data on uses and advantages of these rods. 16 pages. Illustrated. 6 in. x 9 in. (F-2235.)

**G-E Arc Welding Sets**

(11) A 16-page bulletin describing the construction features and performance of G-E electric arc-welding equipment, including gasoline engine-driven sets. (GEA-1440G.)

**Hard-Facing with Haynes Stellite**

(12) Hundreds of ways to save money by combating wear are described. Illustrations show many of the innumerable hard-facing applications of Haynes Stellite products. Over 500 performance stories are presented, together with full descriptions of how to apply hard-facing materials. Of value to anyone responsible for low-cost maintenance. 104 pages, 8½ in. x 11 in., illustrated.

**Flame Hardening**

(13) Describes in detail the new process for hardening surface of iron or steel, while at the same time leaving a tough, ductile core. Many applications of the process are briefly described, and a table lists most of the steels particularly suited for flame hardening. 12 pages. Illustrated. 8½ in. x 11 in. (F-3813.)

**Acetylene Generators**

(14) The Sight Feed Generator Co. has an enlightening folder entitled, "Face the Facts." Folder demonstrates manner in which acetylene gas may be obtained at lowest cost without sacrificing convenience or safety. Also tells how a welder may always know exactly how much gas he has available.

**Portable Grinding Equipment**

(15) "Grinding and Finishing with Portable Equipment"—An interesting booklet published by Norton Co. Contains information about correct wheels to use for various types of work done with portable grinders. One section deals especially with wheels for grinding welds on fabricated metal products.

**Haynes Stellite in the Oil Fields**

(16) Describes in detail the hard-facing and hard-setting of oil well drilling tools with Haystellite (diamond substitute) inserts, Haystellite Composite Rod, Haystellite Tube Rod. For engineers, welders, and all oil field men. 32 pages, 8½ in. x 11 in., illustrated.

**The Oxweld CM-16**

(17) Illustrates the many operations which may be performed by this new portable oxy-acetylene cutting machine wherever steel plate is cut to shape. Important features of the machine are fully described, and an illustrated sketch points out various parts and attachments. 4 pages. Illustrated. 8½ in. x 11 in. (F-3311.)

**G-E Transformer Type Welders**

(18) An 8-page descriptive bulletin pointing out where a-c. welding equipment can be most profitably applied, and the advantages, high-quality features, auxiliary control devices, and ratings of G-E transformer sets. (GEA-1750D.)

**Hard-Facing for Rural Shops**

(19) A 28-page booklet describes procedure for hard-facing all types of farming implements. Also contains interesting information on job costs and job shop accounting. Well illustrated. Published by Stoody Co.

**Resistance Welding Electrodes**

(20) Electroloy Co., Inc., are specialists on resistance welding electrodes and electrode alloys for spot, seam, flash, butt and projection. New catalogue includes standard electrodes and electrode holders and physical properties of their alloys including Trodaloy. Engineering experience and assistance is offered.

**CIG Pipe Cutting Machine**

(21) The CIG pipe cutting and beveling machine offers an unusually low cost means of cutting and beveling pipe of diameters from 4 in. upward. Machine uses oxy-acetylene torch. Distinguishing features are portability and speed of assembly.

**Welding Accessories**

(22) A 12-page catalog-type bulletin on the full line of G-E arc-welding accessories. Contains prices on a variety of equipment such as helmets, electrode holders, protective clothing, etc. (GEA-2704.)

**Principles of Bronze-Welding**

(23) A detailed discussion of the general characteristics of bronze welding rod and description of procedures to be followed in order to obtain maximum benefits from the process. Both advantages and limitations of bronze-welding are carefully pointed out. 6 pages. Illustrated. 8½ in. x 11 in. (F-2482.)

**Moly-Nickel Welding Rods**

(24) The Chicago Hardware Foundry Co. offers a 6-page folder on moly-nickel welding rods (gray iron alloyed with molybdenum to assure non-porous, gas-tight, leak-proof texture, and nickel to insure easy machineability). Said to be an improved rod for cast-iron welding.

**Tisco Hard Surfacing Electrodes**

(25) Literature describing a series of easily applied electrodes for hard surfacing or building up worn parts of carbon, alloy or 12% manganese steel. Various types are available which provide maximum resistance to abrasion, shock and impact, singly or in combination.

**Preheating Equipment**

(26) Torit preheaters use kerosene or ordinary low-grade distillate and are recommended for preheating in connection with welding and brazing. They save labor and gas cost on large welding jobs and enable welders to do better work. A preheated casting is said to be more easily welded.

# New Technical Literature

**Welding White Metal**

(27) "Instructions for Welding White Metal and Soldering Aluminum by Aladdin Method," gives instructions for application of Aladdin rod manufactured by Aladdin Rod & Flux Mfg. Co.

**Haynes Stelliting of Plowshares**

(28) Step-by-step instructions for the quick and easy application of hard-facing alloys to plowshares. Also lists advertising aids Haynes Stellite Co. will furnish. In a form to be tacked to the shop wall for ready reference. Every welding shop should have one. 24 in. x 21 in. unfolded, illustrated.

**Electrode Estimator**

(29) A handy estimator for determining arc-welding electrode quantities. Based on average conditions, this 8-page booklet gives, in tabular form, the approximate weight of different kinds of electrodes used in the manual welding of the various common joints. (GEA-1749.)

**Welded Piping**

(30) A survey of recent developments in welding building and industrial piping that simplify design and lower costs. It includes practical suggestions on layout, welded joints and fittings, preparation of drawings and specifications, and efficient organization for fabrication and erection of welded piping. 12 pages. Illustrated. 8½ in. x 11 in. (F-3450.)

**CIG Automatic Gas-O-Graph**

(31) Describes CIG flame cutting machine used in automatic mechanical flame cutting of all types of shapes from steel plates and billets. Any type of shape can be quickly and accurately cut. Machining is seldom necessary.

**Welded Outlets for Piping**

(32) A new, four-page bulletin No. WT28 just issued by Bonney Forge & Tool Works, describing Bonney WeldOlets and Thred-Olets, the "welded outlets for piping." Additional advantages of the fittings are briefly described. Tables are included giving sizes which are available from stock, dimensions, weights, list prices, etc.

**Speer Welding Carbon**

(33) Speer welding carbon products and their use in carbon arc welding are described in a booklet just issued by Speer Carbon Co. Contains useful hints for the practical welder with tables of average cutting speeds, operating currents and specifications for welding carbon products.

**Welding and Preheating Equipment**

(34) A handy reference booklet of 28 pages, covering complete line of Imperial welding and cutting torches, regulators, gas and air torches, soldering outfits, lead burning equipment, welding supplies and extra parts. Booklet is 3¼ in. x 6¼ in. Conveniently indexed for quick reference.

**Airco-DB No. 10 Radiagraph**

(35) A booklet featuring the new Airco-DB No. 10 Radiagraph has just been published by Air Reduction Sales Co. It explains in detail many new features and diversified cutting operations that can be done with this light weight gas cutting machine. Well illustrated with full information on mechanical features.

**Smootharc Welding Electrodes**

(36) The Harnischfeger Corp. announces Bulletin R-5 containing information and data on Smootharc welding electrodes. Bulletin includes data on spark tests, procedure and informative suggestions to make it a valuable reference book for welding users and operators.

**Calcium Carbide Applications**

(37) Shawinigan Products Corp., manufacturers of Shawinigan Carbide, offer to users of calcium carbide for whatever purpose, their folder entitled, "The Light In Your Castle and the Functions of Acetylene Gas."

**Hard-Facing Materials**

(38) Tabulated properties, application methods and available sizes of hard-facing and hard-setting materials. In a form ready to be tacked to the shop wall. 4 pages, 8½ in. x 11 in.

**Cold Drawn Steels**

(39) Union Drawn Steel Division of Republic Steel Corp. announces a 24-page illustrated handbook, "Cutting Costs with Cold Drawn Steel." This is a non-technical discussion of the results of cold drawing and the utilization of cold drawn steel in the manufacture of steel parts.

**Carbon Arc Welding**

(40) A 42-page booklet by W. J. Chaffee, of Hobart Brothers Co., describing present applications of the carbon arc. Contains information on carbon electrodes, types of welds which can be made, including welding of galvanized steel, hard surfacing, reclamation of castings, etc.

**New Hard-Surfacing Electrodes**

(41) A four page bulletin describes two grades of hard-surfacing electrodes recently introduced by J. D. Adams Co. They are made both for arc-welding and oxy-acetylene welding. The applications are well described and profusely illustrated.

**Geweco Welding Equipment**

(42) An 8-page pocket size folder describes the Geweco welding and cutting apparatus and standard outfits completely assembled. Issued by General Welding & Equipment Co.

**New 40-Volt Arc Welder**

(43) The Hobart Brothers Co. has issued a 20-page booklet, describing how the new Hobart Simplified 40-volt Arc Welder permits operating savings. Examples are given of reduction in production costs made possible by redesign of products for fabrication by welding.

**Arc-Welding Accessories**

(44) An 8-page catalog bulletin by J. D. Adams Co. features removable jaw, protected spring electrode holders, weld scalers, eye balm, as well as numerous other items of accessories and supplies for arc-welders.

**Building an Arc Welder**

(45) The Hobart Brothers Co. has issued Bulletin EW-62 giving 12 rules to follow in "building your own welder." Rule No. 1 is, "Use a generator especially designed for arc welding." Other rules cover various types of power supply, speed regulation, etc.

**Hard-Surfacing Alloys**

(46) A full page reprint bulletin by F. E. Garriott, chief metallurgist, J. D. Adams Co. primarily covers application of hard-surfacing steel mill rolls. It further describes various types of hard-surfacing materials and makes comparisons of their applications. Well illustrated.

**Duro Electrode Holders**

(47) Churchward Engineering Co., Inc., has literature available covering the complete line of Duro Electrode Holders. These holders are ruggedly constructed and all have insulated handles with either soldered or solderless type connection.

**Manganese Steel Welding**

(48) "A.B.C.'s of Manganese Steel Welding" is the title of a small vest pocket booklet by B. H. Payne of Stulz-Sickles Co. Information is arranged in question and answer form.

**THE WELDING ENGINEER** — **September, 1938**

**608 So. Dearborn St., Chicago, Ill.**

**Please send me the literature as checked (X) on the list below:**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 ☐ | 6 ☐ | 11 ☐ | 16 ☐ | 21 ☐ | 26 ☐ | 31 ☐ | 36 ☐ | 41 ☐ | 46 ☐ |
| 2 ☐ | 7 ☐ | 12 ☐ | 17 ☐ | 22 ☐ | 27 ☐ | 32 ☐ | 37 ☐ | 42 ☐ | 47 ☐ |
| 3 ☐ | 8 ☐ | 13 ☐ | 18 ☐ | 23 ☐ | 28 ☐ | 33 ☐ | 38 ☐ | 43 ☐ | 48 ☐ |
| 4 ☐ | 9 ☐ | 14 ☐ | 19 ☐ | 24 ☐ | 29 ☐ | 34 ☐ | 39 ☐ | 44 ☐ | |
| 5 ☐ | 10 ☐ | 15 ☐ | 20 ☐ | 25 ☐ | 30 ☐ | 35 ☐ | 40 ☐ | 45 ☐ | |

**(To be sure of receiving literature ordered please indicate below your company affiliation and position.)**

**Name** .....

**Street Address** .....

**City** ..... **State** .....

**Company Affiliation** .....

**Position** .....

NATIONAL METAL CONGRESS AND EXPOSITION
The
WORLD'S
GREATEST
ANNUAL EVENT
IN THE
METAL
INDUSTRIES
DETROIT 1938